January 1963

# culture

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*Machines for Better Grassland* . . . . . *W. Ellison*

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*Potatoes by the Box* . . . . . *H. J. Hine*

*Selling Beef Stores by Weight* . . . . *Henry Edmunds*

*Winter Cauliflower in Thanet* . . . . . *P. Clarke*

*Fitting-in Self-feeding* . . . . . *Nigel Harvey*

*The Feeding Value of Haylage* . . . . *Phyllis Farmer*


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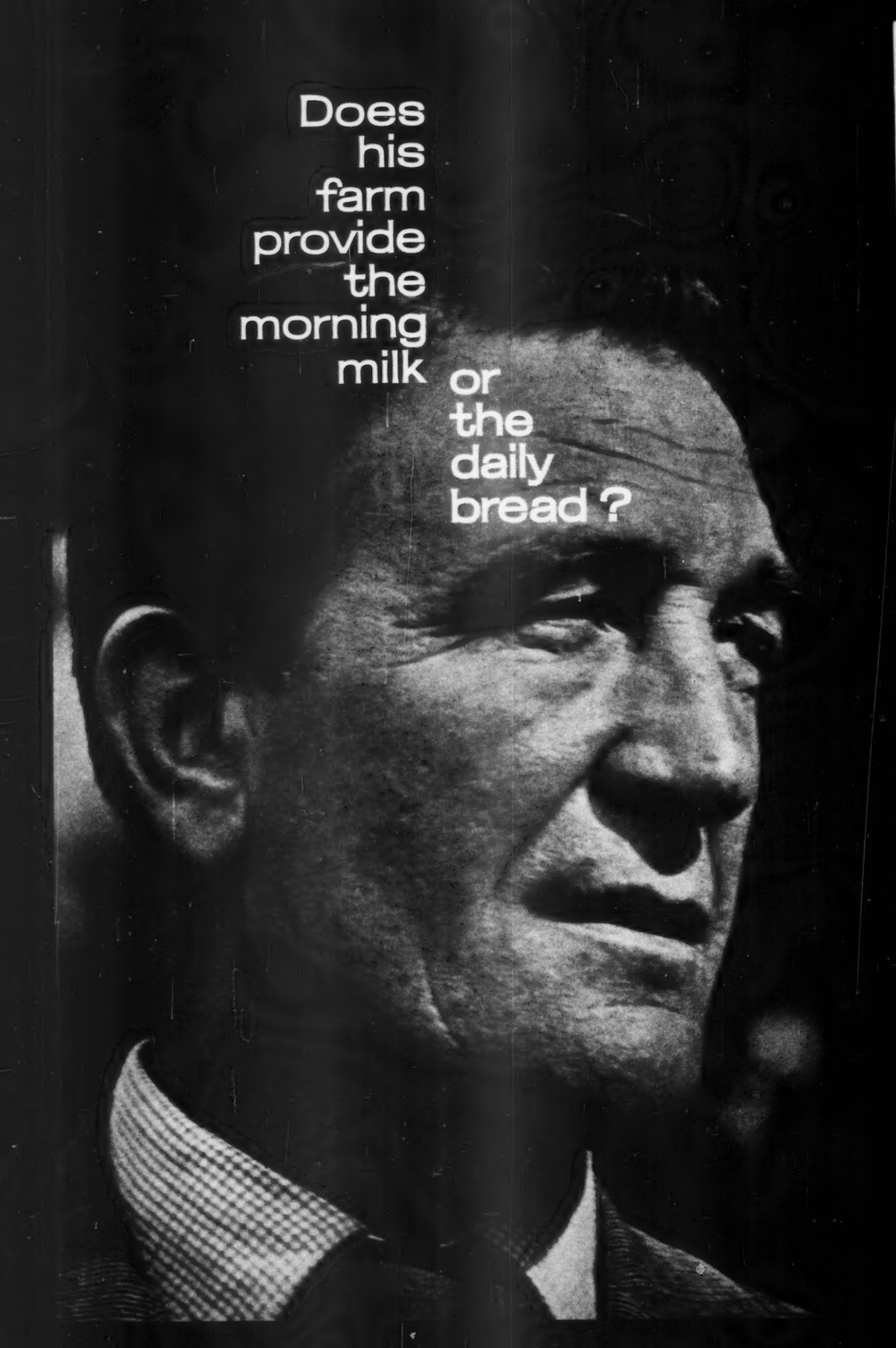
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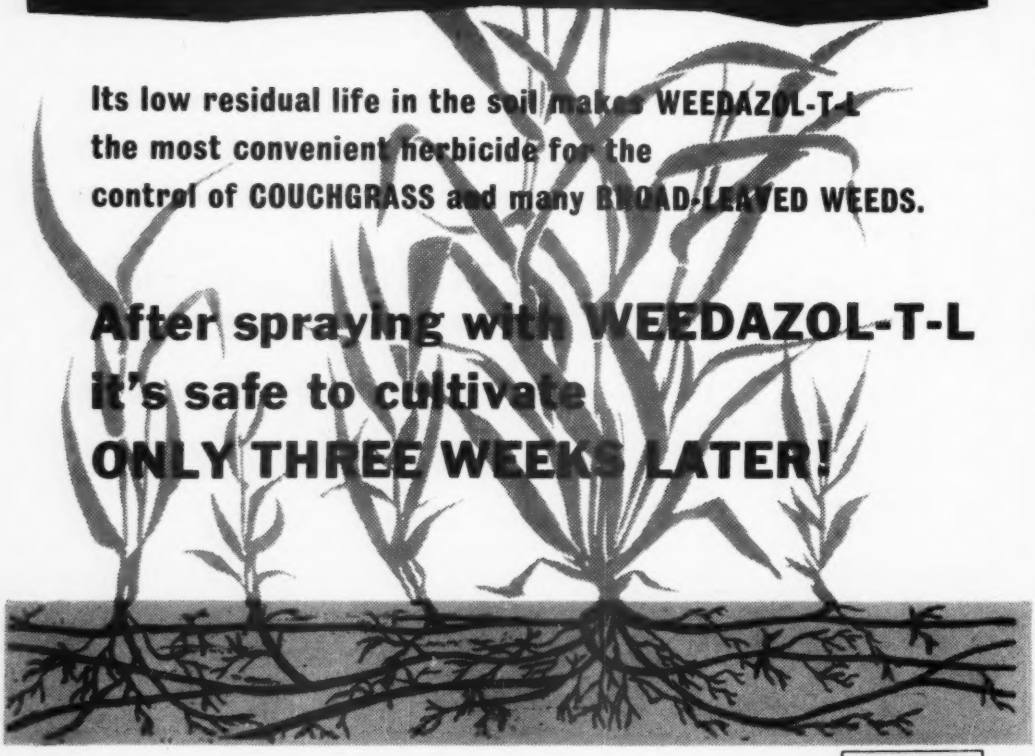

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AGRICULTURAL CHEMICALS APPROVAL SCHEME 1963

# Agriculture

VOLUME 70 · NUMBER 1 · JANUARY 1963

Editorial Offices
Ministry of Agriculture, Fisheries and Food
Whitehall Place, London S.W.1. Trafalgar 7711

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# 1963

# National Productivity Year

No business is so good that it cannot be improved. And that, fundamentally, is the thought that the British Productivity Council will be trying to stimulate throughout Britain in 1963. We in the farming world are justly proud of our productivity record, but can we not push just a little bit harder?

There are two ways of looking at productivity—production can be increased from the same resources, or the same level of production can be maintained from fewer resources. Either way, the result should be the same—greater profitability. The individual farmer benefits and so does the nation.

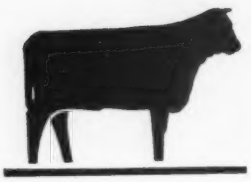
Local productivity committees provide the means for the different industries to exchange ideas and experience. Agriculture has much to offer in solving the management problems of other industries, but equally there is a great deal to be gained from the commercial world before we can claim 'Not every businessman is a farmer, but every farmer is a businessman'.

The Ministry's Advisory Services will continue to play a prominent part in helping farmers to improve their businesses, whether by advice on management, capital investment or new techniques. And because the pen can so mightily support the ploughshare, our *Journal*, too, will have its part to play.

*We wish all our readers a*

*very successful year*

The Editor



HARROGATE

**A panel of breeders, farmers, geneticists and advisers under the Chairmanship of *Prof. M. McG. Cooper* reported to the Harrogate Livestock Breeding Conference when it met in November**

WALTER SMITH

**looks at some of the salient points**

# Considering Beef

THE beef industry in Britain is based partly on the dairy industry and partly on special-purpose beef breeding herds. An estimate of the sources of beef cattle slaughtered in Britain is given at the bottom of the page.

Our home-bred beef stores are the produce of some 800,000 single-suckled cows, which are of various types—beef, dairy and dual-purpose—mated annually to beef bulls. Imported Irish stores are largely out of dual-purpose cows and sired by beef bulls; on the basis of artificial insemination data it is estimated that about 300,000 of the dairy-bred stores are got by beef bulls.

Although these facts establish the dominant place of the dairy industry as the source of beef stores, the contribution of beef breeds is nevertheless seen to be substantial. Out of 2,100,000 store cattle, two-thirds are by beef bulls.

| *Type* | *Number* | *Weight of Beef* (million cwt) |
|---|---|---|
| Irish stores | 500,000 | 2·6 |
| Beef-bred stores | 600,000 | 3·1 |
| Discarded breeding stock | 700,000 | 4·0 |
| Dairy-bred stores | 1,000,000 | 5·0 |
| | 2,800,000 | 14·7 |

## Structure of pedigree herds

The panel included eight breeds in its classification of special-purpose beef breeds—Aberdeen-Angus, Beef Shorthorn, Devon, Galloway, Hereford, Highland, Lincoln Red and Sussex. The Aberdeen-Angus and Shorthorn are important in Scotland, the Hereford being the most important in the rest of Britain. The Galloway and West Highland have a special adaptation function; the remainder, Lincoln Red, Sussex and Devon, are important in their own localities.

The striking feature of herd structure, as measured by annual registrations, is the small average size in all eight breeds. The Hereford and Aberdeen-Angus annual registrations average less than four females and three males per herd; only the Lincoln Red average more than ten females.

This situation means that very few herds have sufficient strength to embark on independent programmes of progeny testing and there is thus a need for very close collaboration between breeders if they are to enjoy the benefits of progeny testing.

Traditionally, pedigree beef cattle breeders have worked independently, but the future demands that they should combine their efforts to make maximum use of the potential of modern aids to improvement. A pooling of breeding resources would create a sufficiently large population of animals to develop progeny testing and to exploit superior animals revealed by it. The potent tool of artificial insemination would be essential for collaborative breeding in pedigree herds. But except for the Lincoln Red Cattle Society (bulls and heifers) and the Devon Herd Book Society (heifers only) beef breed societies do not at present accept registration of animals produced by artificial insemination. Such a restriction cannot be in the best interests of improvement of a breed as a whole because it precludes the spread of the merit of outstanding sires.

The export trade is a valuable incentive to pedigree breeders, but in terms of numbers it is relatively unimportant. In 1961 exports amounted to about 2 per cent of the annual registrations in the eight breeds studied.

## Bull licensing

The panel recommended that the purposes and procedures of bull licensing should be reviewed. It felt that assessment of a bull's breeding worth by his appearance is not sufficient to satisfy present-day requirements and that records of performance should supplement visual appraisal as a basis for licensing. As a first step, licences might be restricted to pedigree bulls and thus give breed societies the responsibility for safeguarding type in their own breeds.

## Objectives in breeding

It is very important that pedigree breeders should concentrate on intensive selection for characters of commercial importance: weight for age; economy of food use; fertility; carcass quality in breeds providing 'finishing' sires; mothering, milking and temperament qualities in those breeds which provide females for commercial beef breeding; and in certain breeds, adaptation attributes for special environments.

Thus it is important that breeds should continue to have different objectives so that each fulfils its function to the best advantage. For example, it would

be undesirable for the Galloway or West Highland to breed for early maturity, since in doing so these breeds could lose much of their value of adaptation to difficult environments. There is also the need for certain beef breeds to provide crossing bulls which will produce different weights of carcass at an early age. It is recommended that each breed society should undertake immediately a re-appraisal of its objectives and function so that there may be concerted efforts towards the realistic goals outlined.

High growth rate appears to have reasonably high heritability. This is fortunate, because it is an important economic factor in its own right and is also highly correlated with economy of food conversion. But growth rate must be considered along with carcass quality; it would be to the detriment of a breed if conformation were sacrificed as the result of indiscriminate selection for weight gain only.

The beef industry clearly requires more precise definitions of carcass quality so that breeders may be given guidance on what they should select for; this task could be one of priority for the proposed Meat Research Insitute. Nevertheless it can be said that selection for maximum muscle development is vital; the amount of fat is governed by the degree of finish. Distribution of fat is a component of carcass quality, but it yet remains to be determined how far it is influenced by selection.

Performance recording as an aid to breeding is meaningful only if stock are maintained under conditions of commercial practice. Its value rests not in comparisons between herds but on comparisons within herds, so giving the breeder a basis for culling. Farm recording is, therefore, a necessity and suitable facilities must be made for it.

## Measurement of performance

The panel discussed beef recording, performance testing and progeny testing as procedures producing factual data on which to base breeding plans.

Beef recording, which is more accurately described as a farm weighing service, has two principal functions. First as a service to commercial feeders so that they may check on husbandry practice. Second as a service to pedigree breeders to make possible performance and progeny testing on the farm by an individual breeder or by groups of breeders using the same sire or sires.

Performance testing of beef bulls is the measurement of their growth rate and food conversion efficiency and the assessment of their conformation. Large herds will be able to adopt on-farm testing, but, because of the small size of many herds, it will be necessary to establish central testing stations. Furthermore, comparisons between bulls from different herds of the same breed are valid only under standard conditions—and these are possible only at a central station.

The panel reviewed performance testing abroad, in the U.S.A., Canada, Argentina and New Zealand, and the results of pilot schemes by the N.A.A.S., B.O.C.M. and the North of Scotland College in this country. It concluded that performance testing should be established as an adequate service for breeders, but before doing so there should be considerable tidying up of procedures. Further investigation is needed to decide on schemes for 'finishing' sires and for sires of breeds required for difficult environments. There is an obvious need for interested parties within the beef industry to get together for the purpose of working out satisfactory procedures for the techniques of performance testing.

Performance testing is a first screening of potential sires for use in pedigree work and in A.I. for commercial beef breeding. Progeny testing is the best measurement of a sire's breeding worth, since it reveals the degree of transmission of weakly inherited characters and embraces carcass appraisal as part of the test. But the present scope and scale of operations in progeny testing merely touches the fringe of what is required. There must also be reliable and standard appraisal procedures if the full value of progeny testing is to be exploited. It seems that it should be organized on the basis of contemporary comparisons on farms, but the panel believed that centralized testing stations will be required, especially for precise carcass studies.

## Artificial insemination

Artificial insemination, once accepted by breed societies in the registration of pedigree cattle, could play a double part in beef cattle improvement. Firstly, it would facilitate progeny tests, on the basis of contemporary comparisons, of a relatively large number of bulls mated to both pedigree and commercial females. Secondly, it would facilitate co-operative breeding on the part of groups of pedigree breeders. The panel recognized the justified fears of breeders that artificial insemination would be antagonistic to the sale of bulls, which is the main source of income from pedigree beef breeding. The loss could be offset in considerable measure if royalty payments were instituted in respect of proven sires, including those used for commercial beef breeding through A.I., as well as for pedigree breeding. The panel recommended that royalties be payable only when a bull is proven for widespread use by virtue of his performance and progeny test results.

## A national authority for beef improvement

The report states 'the beef industry suffers because it has no organization with a comprehensive responsibility for its problems'. What is wanted, in the panel's view, is an organization with power and finance to provide the services which the industry requires.

The functions envisaged would be: development of on-farm recording; organization of central performance testing; conduct of progeny tests; processing and interpretation of factual data; and an assessment of problems and the provision of funds for research.

Such an organization would also embrace production problems, marketing guidance and intelligence and any matters of concern to the industry. It would not be concerned with marketing as such but would bear the same relationship to the industry as that of the Production Division of the M.M.B. or the Pig Industry Development Authority.

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**Walter R. Smith, B.Sc., N.D.A.,** is Deputy Director of the Yorks and Lancs Region of the National Agricultural Advisory Service. He was previously Regional Livestock Husbandry Officer for Wales, where beef breeding was one of his special interests.

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*Improving Grassland without the Plough*

# Machines for Better Grassland

W. ELLISON

'NEW grass for old' has been the cry for the last twenty years or more. But in spite of the war-time ploughing-up campaign and continued ploughing grants, as well as the advice and exhortations of numerous grassland pundits, it is claimed that there are still nearly ten million acres of so-called 'permanent grass' in this country most of which could and should be improved by ploughing. Since the rate of ploughing up old grass in many parts of the country is already slowing down, it looks as though much will remain as a hard core immune from the plough as a means of improvement. Few would argue that this grassland is not capable of giving greatly increased production. Disagreement is, however, likely to continue as to the best way of achieving this—to plough or not to plough.

I took an active part in ploughing and reclaiming thousands of acres of upland and lowland grassland during the war years. Therefore I have a keen appreciation of the merits of the plough as a tool in grassland improvement.

Like any other technique in farming, new grass for old, through the use of the plough, is simply a factor in management and must, amongst other things, be suited to the farmer's abilities and economic circumstances if it's to be a financial success. There have been a good many instances up and down the country where grassland improvement by ploughing has proved itself to be a first-class means of losing rather than making money. Not only can it be expensive in itself, but more often than not extra capital has to be found for additional stock if the extra production is to be properly utilized. Even with a high degree of managerial skill, it may not be the best way to get the most economic results.

For these reasons, research workers, advisers and farmers are showing an increasing interest in alternative methods of grassland improvement based on the use of various types of other machines or chemicals, or both.

## Improvement by machines

It may be as well first to ask what such machines are expected to achieve. Briefly, it is to improve the productivity, quality and palatibility of the herbage. To do this it may be necessary to (a) increase the efficacy with which lime and fertilizers can work into the soil to act on the sward, and (b) change the species composition of the sward and thereby improve its nutritive value and palatability. It follows then that machines of different types and functions will be required. The efficacy of lime and fertilizers is often influenced by the presence of accumulated undecayed vegetable matter which may form a surface or roof mat, or both. Such mats are usually associated with acid soil. This must be rectified by liming. To deal with either a surface or root mat, some form of implement must be used which is capable of a penetrating and disturbing action. Spiked, tined or disc harrows, or certain modified cultivators, will usually do this. For surface mats, ripper and pitch-poled harrows (unfortunately more common before the war than they are now) were extremely useful, but the ordinary chain-harrow is almost useless for this purpose.

There are, of course, greatly differing degrees of mat formation, ranging from the early stages such as are found in declining leys to the solid, dense mats that occur in many hill and upland swards dominated by bracken, *nardus* or *molinia*. For these, the implements already mentioned are often of little or no use; one must turn to something with a more powerful and positive action, such as some type of rotary cultivator.

## Rotary cultivators

This group of machines is, in fact, most useful. They allow lime and fertilizers to penetrate the soil effectively, and at the same time leave a proportion of bare soil into which seeds of better species can be sown. The tractor power now available on most farms and the fact that power-driven rotary cultivators can be carried on the three-point linkage enables them to operate on areas where it would be impossible, or certainly difficult, to plough. H. Fail at Newcastle has shown that rotary cultivators can be used for the eradication of bracken on reasonably stone-free ground. The value of these machines in pasture improvement was also well illustrated at a demonstration featured by the R.A.S.E. and the Ministry of Agriculture at this year's Royal Show at Newcastle, coupled with the over-sowing of seed and fertilizer.

Where it is necessary to improve a sward by the introduction of better species of grasses and clovers, rotary machines have much to commend them over any type of harrow or cultivator. So far, however, little precise experimental work in terms of economic and agronomic results has been done in this country on rotary cultivation methods, as against any other grassland improvement technique.

In recent years attention has turned to other mechanical methods of either introducing or maintaining better herbage species in a sward. One of these is known as sod-seeding.

## Sod-seeding

A method that has been practised successfully in Australia, New Zealand and the U.S.A. is sod seeding. In America it is known as range-seeding. The principle is that of sowing seed and fertilizer into an existing sward by means

*A tiller body fitted with plough skim and disc coulter attachments for sowing seed and fertilizer into existing sward*

of coulters which make slits in the ground giving a 'placement' effect to both seed and fertilizer. Most success overseas seems to have been achieved where conditions are such that the seed could be sown at the end of the 'dead' season in a sparse sward; the seeds germinate when growing conditions return and the new seedlings are able to establish themselves with relatively little competition from the existing sward. Such conditions seldom prevail in Britain. Consequently seeds sod-sown into a pasture here on the 'slit' principle usually suffer severely through competition from the existing sward, which is able to utilize any fertilizers applied by the sod-seeder before the new seedlings become established.

Attempts are being made by the Crop Husbandry department at Aberystwyth to develop a sod-seeder which will remove a ribbon of turf 2–2½ inches wide and 1–1½ inches deep, leaving a band of bare soil in which the newly-sown seedlings can develop with less competition from the surrounding sward. Even with this machine, results to date have not been too encouraging and various aspects, such as time of sowing and method of covering the seed, need further study. The same machine has, however, been used successfully for sod-seeding both rape and kale into a pasture destined to be ploughed up in the following year. But that is another story.

So far as the sod-seeding of grass species is concerned, in the work at Aberystwyth as well as elsewhere with machines using the slit principle, attention is being given to the possibilities of using various herbicides, applied either broadcast or in bands at or before sod-seeding. Interesting and promising preliminary results have been obtained, but this kind of work leads one into the broader field now popularly known as chemical ploughing.

## Chemical ploughing

Although this is not a mechanical method of grassland improvement, it is one in which machines may have a complementary part to play. Chemicals are now available (and more are promised) that will give either a complete or a selective kill of the existing species in a sward.

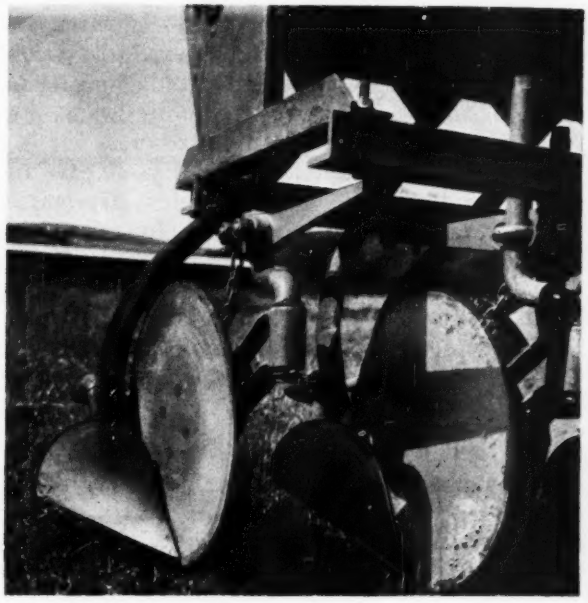
Under certain circumstances such chemicals may be used to form a mulch from the dead herbage in which newly-sown seeds can germinate and establish. For other conditions some of the machines already discussed may be needed to get rid of excessive mat or dead material or to provide a tilth into which seeds can be sown in a sward that has been completely or selectively killed. Much more experimental work will need to be carried out in this country before satisfactory techniques are evolved for use by farmers.

## Mowers, cutters, forage harvesters, etc.

To maintain the grazing sward in a nutrititive and palatable condition, we need machines that can be used to reduce, or even eliminate, undesirable species while at the same time keeping the better species in a more nutritive and palatable condition for the grazing animal.

Pasture topping seemed to be practised much more generally years ago, in the days of the horse, than it is now. Whether that was so because of the need to exercise the horses or because the horse and horse-type of mower was better suited to the job or because time was a less scarce commodity than it is now, is anybody's guess. But it does pose the question: is topping any good, and does it nowadays justify the time, labour and expense involved? There is little experimental evidence either way, but general experience seems to suggest that it does. Many farmers are reluctant to use a tractor and mower because they feel that, in topping, the mower tends to knock itself to bits. On the other hand, more and more people are using the forage harvester for just this job and seem to be very pleased with the results. Others have even gone to the expense of buying some type of gang or rotary mower to keep their pastures in a short nutritive condition.

Whatever method is adopted, there can be no doubt that some form of topping is not only an effective means of controlling such noxious plants as rushes, docks and thistles, but it will also reduce the proportion of the poorer species of grasses and give the better types a greater chance of increasing



*Close-up of plough disc-skim coulter fitted to tiller body*

their contribution to the ultimate composition of the sward. Furthermore, topping must in many instances be one of the most effective means of sustaining or increasing the proportion of white clover.

To those who say that the management of the sward must be subservient to the needs of the grazing animal, some form of topping machine must be the answer.

## Other machines

There are many other machines which have either a specialist function, such as bracken crushers and bruisers, or a complementary part to play in any grassland improvement programme, e.g., sub-soilers, drainage machines, sprayers and, by no means least, fertilizer distributors. In this connection it is most important to emphasize the need for good soil structure and good soil drainage as a basic requirement to improved grassland production. No doubt in many cases much of the initial increase in production after ploughing results from a temporary improvement of soil structure and drainage. In other cases the opposite may be true, especially where heavier clay soils are ploughed too deeply and subsequently poached by being grazed under wet conditions.

## General management

This leads to the general point that whatever method of grassland improvement is adopted through the use of machinery it will be of little avail, either agronomically or economically, unless it is accompanied by a reasonably good standard of grassland management designed to sustain the productivity of the better species. In this, the application of adequate lime and fertilizers has a vital role to play. It may be worth reiterating a question that many good practical farmers have asked over the last twenty years: 'If one spent the same amount of money on cultivating and fertilizing an old permanent pasture as one does on ploughing and reseeding, what would be the result?'

No one seems to know—certainly not in terms of an economic answer. But results at the Ministry of Agriculture's Experimental Husbandry Farm, Great House in Lancashire and at Rothamsted lend weight to the need for a critical examination of methods other than ploughing for increasing production from our grasslands under certain conditions. In fact it would seem from the 1961 Rothamsted Annual Report that old grass left in place, reseeded grass left to grow indefinitely, and three-year leys all gave about the same total weight of dry matter per acre. One other great advantage of the methods discussed in this article, apart from chemical ploughing, is that there need be no risk of failure and consequent loss of grazing such as has occurred this year in very many cases of direct reseeding because of the prolonged drought. Such failures are an embarrassment on any farm, but on a small, heavily-stocked farm they can be disastrous. Apart from the practical difficulties they create, such failures can make the ultimate cost of the new sward very high indeed.

## An end in themselves

It would be unfortunate to give the impression that grassland improvement through the use of the plough is necessarily in conflict with other methods, since in very many cases and on very many farms they can in fact be complementary. The methods discussed in this article may be an excellent form of

pre-treatment prior to ploughing; they may be a method of sustaining production from improved grasslands; or they may well be an end in themselves. This is particularly true in the case of heavily-stocked farms that cannot afford failures or long periods of lost grazing. It is equally true that these methods may be best suited to farmers who haven't enough money to meet the cost of more expensive methods and the need for extra stock.

The major part of British farming production comes from grass. And we want good grass to help out the concentrates. The greater use of machines and techniques described above may well prove to be the best means of producing grass of the right quantity and quality at the lowest possible cost in the future.

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PIONEERS OF MODERN BRITISH FARMING

# He Farms a Mountain

**The Story of CAPTAIN GEORGE BENNETT-EVANS**

*by* ***William Davies***

*A ddysgodd wneud y gors yn weirglodd ffrwythlon*
*I godi'r ddaear las ar wyneb anial dir**

THE Welsh reader will respond at once to the beautiful rhythm of these words. Those who also have the privilege of knowing George Lewis Bennett-Evans will appreciate how perfectly the quotation applies to the man and to his work on the hills of Plynlimmon. It is important that the widest possible public should understand the implications of what he has achieved during his long career as a Welsh sheep farmer. His achievements are the result of the integration of practice and science by a man of great natural ability and of strong pioneering instincts.

*He learnt to transform bog to fruitful pasture and to replace desert by greensward.

*Capt. G. Bennett-Evans*

Captain Bennett-Evans, now past his mid-seventies, has been a pioneer throughout his life. The hill country of Britain and its development is something very dear to him, but his interests are even wider, for he is the patriot who sees the importance to the whole nation of making better use of our uplands—an area which accounts for 46 per cent of the total acreage of all grasslands in the United Kingdom. They are as under-developed as they were at the time of the first Elizabeth, four centuries ago. Bennett-Evans has shown that this need not be, and it is for the British nation to show readiness to follow his lead and to ensure further development along the new paths whose signposts are already on Plynlimmon.

Bennett-Evans was educated at Oswestry Grammar School and Downing College, Cambridge. He has played for Wales in international football; was in Kitchener's army by 1914 and served in Gallipoli, Egypt and France and was wounded in battle. He is the elected member for Wales on the British Wool Marketing Board, a member of the B.B.C. Advisory Council for Wales and of the Forestry Advisory Committee for Montgomeryshire, and was on the Agricultural Executive Committee for 15 years until he retired in 1961. He was awarded the O.B.E. in 1955 and was the first winner (1957) of the Sir Bryner Jones Memorial Trophy (Royal Welsh Agricultural Society). This was followed by the Bledislow Gold Medal (Royal Agricultural Society of England) in 1959. The University of Wales conferred on him the degree of Master of Science in 1960 for 'outstanding pioneering work as an experimental farmer and for his wide public service'.

## Manod Estate, Plynlimmon

Turn now to his work on Plynlimmon and its implications in the improvement of both animals and pasture. His experience has led him to recognize

the important part which hill country can play in our agricultural development. The Manod Estate is about 5,000 acres, all of it above the 1,000 ft contour and extending to the peak of Plynlimmon (2,468 ft). When Bennett-Evans began his work in 1912 the mountain pastures of Manod were on unfenced open hillsides and were dominated by Molinia bog, mat grass and heather on the slopes. They were typical, therefore, of upland grazings throughout Britain. The estate then carried a flock of some 2,000 Welsh ewes but no cattle. Today on the same land there are 6,000 adult sheep, including 4,500 ewes which, when lambs are added, give a peak sheep population of 9,000.

In addition, there is a herd of 100 polled pedigree Welsh Black cows which, with the annual calf crop, give a peak figure of 250 cattle. During the past thirty years the naturally polled character has been bred into the herd, which is now a main source of pedigree polled Welsh Black cattle. The whole herd is at pasture all the year round; the cows calve on the open hill between November and February and remain above 1,500 ft in winter as in summer. Hand feeding consists of 7 lb of rough hay per cow per day during the winter, with double ration at times of deep snowfall. The hay is fed at strategically placed sites over the hillsides, so that the maximum benefit may be obtained from hoof cultivation. The cattle act as servants of the sheep; they function as improvers of the grassland by tearing up the rough tussocks, thus encouraging the finer grasses and clovers.

## New swards on the hill

This winter feeding policy, and particularly the manner of distribution of the feeding camps, has resulted in the replacement of worthless Molinia/Nardus by pastures more useful to the sheep. During the past thirty years some 1,500 acres of mountain land has been limed at the rate of 2 tons per acre of ground limestone, some of it being treated a second time. Phosphate is applied as rock phosphate or slag at about 10 cwt per acre. Again, some land has been dresssed a second time. Seed cleanings containing white clover have been sown and the new clover-dominant swards are of better composition than many permanent pastures in lowland Britain. They are productive and are seldom affected by drought in an annual rainfall of some 80 inches.

The greater part of this pasture improvement has been achieved without ploughing or surface cultivation. The lime and phosphate have been distributed over the steep valley sides by a large 'blower', ensuring the right wind speed for the purpose of distant distribution. Capt. Bennett-Evans pioneered aerial top dressing in Britain, the first distribution of lime and phosphates by airplane was carried out on his sheepwalk (1952) in collaboration with the *Farmers Weekly* and the Bristol Airplane Company.

The improvement methods now so successful were clearly not developed overnight. Behind the success is a list of trial and error. At first it was thought that the provision of better shelter for sheep would of itself improve the hills, and Nissen-type shelters were provided. They were not successful, but shelter-belts of conifers planted across the contour have been established at Manod over the past forty years at a rate of some 3 to 8 acres a year. Capt. Bennett-Evans pioneered large-scale dormitories with slatted floors, together with internal feeding arrangements for the hill sheep. He now winters over 1,000 ewe hoggs in this manner, and the basic idea has been adopted in other parts of the country.

His early experience, however, convinced him that better pastures and a higher plane of nutrition were what his sheep needed, and led him to introduce his Welsh Black herd to the hills designed to eat the coarse tussocks in summer and tread the rubbish into the wet ground during winter. At this time he met Sir George Stapledon; two pioneers thus got together and immediately developed a great liking for each other. Something had to happen, and it did; the plough, the rotavator and the caterpillar tractor were soon at work on Plynlimmon. It was Bennett-Evans who sat on the tractor, often on perilously steep slopes and on precipice edges where only the most daring would risk life or implement. So it went on; the plough, surface-scratching implements, lime, phosphates and seed of the pedigree grasses and clovers from the Welsh Plant Breeding Station at Aberystwyth. First-class swards were thus produced in every way comparable to those of the English lowlands.

By the late 1930s, however, it became apparent that neither plough nor cultivator was necessary at this stage of development. Ploughing was expensive and could only be done on selected sites, many of the hillsides being either too steep or too stony. The valley bottoms were too wet and if ploughed tended to revert to rushes and the like. The best and most permanent improvements came after surface treatment, hard grazing with the proper combination of cattle and sheep, coupled with fertilizer treatment and sowing seed of white clover.

## Cahn Hill

The work accomplished by Capt. Bennett-Evans played a large part in developments which led to the establishment in 1933 of the Cahn Hill Improvement Scheme by the Welsh Plant Breeding Station. This in turn led to important developments throughout Britain and influenced practice during the war period when ploughing for corn production was integrated with a national policy of regrassing and ley farming. The Cahn Hill Scheme

*A 'lime-gun' in action on Plynlimmon*

might have become even more closely linked with the Manod estate had the College authorities at Aberystwyth felt able to carry on with the project. Capt. Bennett-Evans continued on his own with limited resources. Such is the spirit of the pioneer. Those who doubt the thesis of free enterprise should make careful note.

## Bennett-Evans has pointed the way

What of the future? George Bennett-Evans is the first to play down his achievements and to say that the real job is still ahead. On a nation-wide basis this is certainly true, for the hills and moorlands of Britain have as yet hardly been touched. On Manod itself, reclamation is still incomplete, but given time it will be done, and the processes may well be hastened as new knowledge and new procedures come to light.

Thus in recent time new grass-killing herbicides have been discovered and these are undergoing preliminary tests. There is some indication that the useless Molinia and Nardus can now be selectively destroyed and so the more valuable Agrostis and fescues encouraged. It seems also that white clover can be successfully established following herbicidal treatment. These new tools and processes still need to be tried out within defined husbandry patterns and different economic systems.

It is men of the calibre and outlook of Capt. Bennett-Evans who are needed for such jobs and to get things moving quickly. New tools and fresh procedures will arise as an outcome of research and experience, but it is of first importance for the British nation to recognize the enormous potential which lies unused on the hills of Britain. Bennett-Evans has shown the way; it is for the rest of us to follow. Not to do so is to imperil the livestock industry of Wales and indeed of Britain as a whole.

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# POTATOES by the BOX

H. J. HINE

*WOODEN BOXES instead of sacks or collecting baskets can take a good deal of fatigue out of potato harvesting and make it easier to get the crop into store with the minimum of damage*

IT was the tractor fore-loader that first made box handling of potatoes feasible. That was seven or eight years ago, and the boxes used were of 5 cwt capacity because at that time the hydraulics of tractors were not able to cope with more than 6 cwt or so with ease. Newer tractors can deal with loads of 10–11 cwt but the 5 cwt size still has advantages in some methods of handling.

The boxes, having been distributed in the field at a convenient spacing, are filled by the pickers and then, when full, picked up by the lifting arms of an attachment to the fore-loader. The arms fit under bearers on the box, and the box is carried to a trailer where the contents are tipped as slowly and gently as possible.

## Labour requirements

Handling potatoes in boxes by hydraulics takes away quite a bit of physical effort—and, of course, some of the need for skill. Fewer men are likely to be needed, but it is not easy to make comparisons of overall labour requirements as between the traditional methods and box handling. This is because it is difficult to weigh correctly all the factors concerned, such as yield and distance of travel.

For example, at Bridget's Experimental Husbandry Farm, near Winchester, potatoes were gathered in sacks in 1960 and in boxes in 1961. Timings were kept in both seasons, but the 1961 yield per acre was only three-quarters as much as it had been in 1960, and the labour cost figures masked such details as the greater amount of overtime worked in 1960 than in 1961. Nevertheless,

the man-hours per ton for loading, transporting and placing in a store building came to 1·5 when boxes were used, compared to 1·7 when sacks were used, and the yield was heavier. The man-hours per acre were 20·8 in the year of higher yield (12·4 tons per acre) when the crop was handled in sacks, and 14·6 when the crop was lighter (9·6 tons per acre) and the potatoes were handled in boxes.

Reckoning all labour at 4*s.* 8*d.* per hour, labour and machinery per acre would have been £8 for 1960 and £6 15*s.* for 1961. Using the same figure of 4*s.* 8*d.* per hour, the cost of labour and machinery per ton went up from £13 when sacks were used to £14 when boxes were used, but the crop was lighter. In the 1962 harvest season, with a 12 ton per acre crop, boxes still cleared away the potatoes at a satisfactory rate.

## On E. Anglian farms

In 1961 in Lincolnshire and the Isle of Ely, records were kept of several different methods of harvesting. On one farm, with an elevator digger lifting alternate rows in advance, eight women were picking up the potatoes, two men were tipping the full baskets into three horse-drawn carts, and two youths were leading the carts to a clamp in the field. The timings gave 25 man-hours per acre and 1·4 man-hours per ton for moving the potatoes from ground to clamp. The yield was about 18 tons per acre.

On a farm where six men were picking and tipping their own baskets into two horse-drawn carts, with one youth leading the carts to a clamp in the field, 22·1 man-hours per acre were used; this was equivalent to 1·4 man-hours per ton, the yield being about 15 tons per acre.

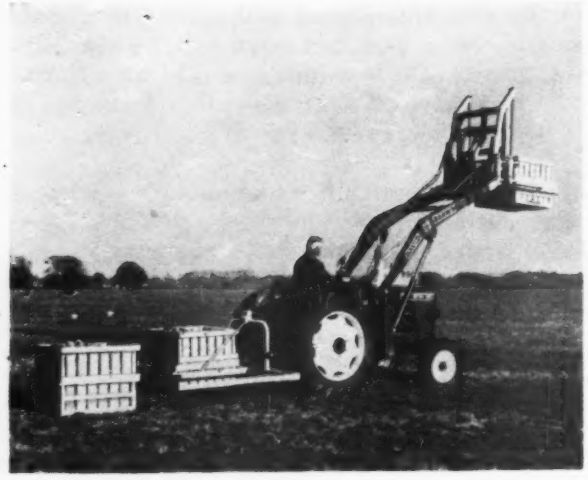
On a farm using 5-cwt boxes with an elevator digger working from the centre of the break, 17 women were filling boxes. The boxes were emptied into two tractors and trailers and carried to an indoor bulk store $\frac{1}{4}$ mile away. One man was heaping at the store. This gave the very high figure of 63·6 man-hours per acre, but the yield was extremely high (25 tons per acre), and the man-hours per ton came out at 2·6.

## Operation in the field

The use of 10-cwt boxes naturally entails longer walks by the pickers to dispose of their load but makes for quicker handling afterwards. On one farm a spinner was being used with one-way lifting and 9 men picking and emptying into 10-cwt boxes. These were carried on a trailer and then tipped into a clamp on the same field. Timings in this case gave 34·3 man-hours per acre and 2·3 man-hours per ton; the yield was about 15 tons to the acre.

Where potatoes are being put into a clamp in the same field, it has been found worth while to carry a second box on a rear-loader as well as the one on the fore-loader. In one set of timings where the yield was about 18 tons per acre and a spinner was used, and seven men and four women and two juvenile pickers were emptying into 10-cwt boxes, the boxes were carried one on the front and one on the rear of the tractor. They were taken to a clamp outside the field but not far away, and here the man-hours per ton came to 2·0, the man-hours per acre being 36·5.

On a long haul some farmers place the filled boxes on to a trailer, which is taken to the store for the boxes to be emptied by a second tractor fore-loader. This system is very satisfactory for heaps of up to about 7 feet high.



*10-cwt boxes can be carried on the rear- as well as on the fore-loader. These boxes have side-bearers to take the arms of the lift*

For bigger heaps an elevator is needed, or perhaps a double extension loader which can get the potatoes up to 12–14 feet without an elevator. A baffle of some kind is useful to prevent the potatoes, when they find their angle of repose, from coming into contact with the wheels of the tractor.

Fore-loaders and trailers have perhaps been used more with hand picking in the field than with complete mechanical harvesting, but some harvesters can be supplied with a platform to carry a box while being filled, and this can be a very efficient method. Alternatively, boxes on trailers have been filled from the discharge elevator of a harvester.

## Less damage

Saving of labour is only one of the reasons for seeking new methods of handling potatoes. Prevention of damage is of great importance especially when the aim is to market them in transparent packs. Extensive tests have been made to find which methods of handling bring the least damage. Careful use of the hydraulics can certainly give the potatoes a fairly smooth journey, but in general, box handling on fore-loaders does not necessarily reduce the risk of damage compared with tipping baskets into a trailer. When the trailers have been filled they move on to the clamp or store and the potatoes receive just the same transport treatment as they would if the trailers had been loaded from baskets.

## Convenience for store

It has occurred to farmers who were using boxes that if only the potatoes could be stored in the boxes and not disturbed until the time came for riddling them, damage could be cut down appreciably.

If the potatoes can be left in the boxes, the choice will be either to place the boxes on trailers or carry them direct on the front or rear of a tractor. The trouble is that 5-cwt or 10-cwt boxes made sturdily enough to be used on the soil in the field are expensive in terms of tonnage of potatoes to be stored. A 5-cwt box costs from 50*s*. to 90*s*. each ready-made. Farm labour could make them a little more cheaply than this, but even so the cost is

likely to come to at least £8 per ton of potatoes stored. Ten-cwt boxes come cheaper per ton than this, perhaps £6–7 per ton. Boxes larger than this are difficult to handle by a tractor fore-loader, and if a large box is made strong enough to be used on the soil in the field it is expensive and is itself heavy.

## 18-cwt boxes

On the assumption that large boxes would be a good thing, some very lightly constructed containers, holding 18 cwt of potatoes, have been made in Britain. They are bound with wire, rather like an orange box, and stand up to their job very well.

Usually three of these boxes are placed on a trailer to be taken to the field. They are kept on the trailer in the field, and the delivery elevator of a complete harvester is arranged to discharge the crop into the boxes. The trailer with its load of three full boxes is then taken to the store, where a mechanical lifter takes them off and stacks them three high in the store. An industrial fork lift or an attachment to an agricultural tractor can be used if preferred.

Boxes of this light construction are perfectly satisfactory as long as the base is kept horizontal. If the box is tipped in such a way that the weight of the potatoes presses against one of the sides, the box is very likely to break. To get the potatoes out of the boxes when they are to be sorted after storage, each box should therefore be put into a tipping cage which fits closely round three sides of the box and strengthens the structure while the potatoes are being emptied out. The cradle holding the box is moved by hydraulic rams in such a way that the box is rotated about one lip for the potatoes to roll off the surface. The rams are supplied from a small oil pump driven by a 1½ h.p. electric motor.

The height of 18-cwt boxes is usually about 3 ft 7 in.—too high for potatoes to be dropped in at harvest time without being damaged. A baffle, made of hessian or canvas on a framework should therefore be used for the first part of the filling.

A height of only 3 ft 7 in. brings the top of the boxes on the trailer to a point a little higher than the sides of a cart would be. It is possible, however,

*5-cwt boxes, with framework at bottom. Lifting arms can be inserted from any side*

to make up a carrier consisting only of axle and chassis, which will take these boxes and produce a quite low-loading outfit. This is particularly useful when the large box method is used with hand picking.

## Breaking the fall

These lightweight boxes for carrying 18 cwt of potatoes can be made up on the farm for as little as £3 5*s*., say £4 per ton of potatoes stored, but the equipment to handle them is more expensive than the adaptations to tractor fore-loaders which can be used with 5–10 cwt boxes. This means that the greater the tonnage of potatoes to be handled, the more worth while do the 18-cwt boxes become, compared with the smaller ones; ninety tons to be lifted and stored per year is probably about the point where the large lightweight box begins to become the cheaper container.

When boxes are stored in a building there is no problem with lateral pressure of the potatoes on the walls and therefore the latter can be of a lighter construction. On the other hand, the building holds less than if the potatoes were put into the store loosely.

**QUICK GUIDE TO SIZES OF THE BOXES**
**(Outside dimensions)**

| | |
|---|---|
| 5 cwt | 2 ft 9 in. × 2 ft 11 in. × 2 ft 8 in. deep |
| 10 cwt | 3 ft 4 in. × 3 ft 10 in. × 2 ft 9 in. deep |
| 18 cwt | 4 ft 5 in. × 4 ft × 3 ft 7 in. deep |

All are made of wood

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**N.A.A.S. QUARTERLY REVIEW—WINTER, 1962**

Among articles in this issue the following subjects are discussed:

Cereal Growing on Dairy Farms . . . . . P. L. Flynn
Cereal Root Eelworm . . . . . C. A. Collingwood
Intensive Management of Ewes and Lambs . . . . Manson and Stobbs
The Economics of Continuous Cereal Production . . . . S. R. Wragg
Vegetable Pre-packing . . . . . P. G. Seary

# Selling Beef Stores by Weight

**What's the point of guessing when animals can be weighed, asks**

**Henry Edmunds**

A RECENT U.S. Marketing Research report had this to say: 'Finishing cattle in feed lots is a comparatively new business and one that has made tremendous growth during the past two decades . . . In a fifteen-year period (1945-61) the number of cattle in feed lots increased by about 72 per cent. Current indications are that the number will continue to rise.'

The intriguing question is whether such developments, perhaps modified, will occur in Britain, and if so, what are likely to be the principles on which they will rest. It is certain that present methods in this country will undergo considerable changes. The interest now being taken over here in ventures such as mechanized feeding of high dry matter silage, high concentrate usage, food recording groups, and performance tests all point this way.

## Buy on weight

Anyone who has studied United States beef methods cannot but be impressed with the cost-consciousness that exists all along the line. And the starting point is with the actual weight of cattle when bought. All stores, whether bought by auction or privately, are purchased at so many cents per live pound (lb). Margins in beef production are too fine to tolerate errors when one of them, weight, can so easily be avoided. There is no purpose in guessing weight when it can be measured much more accurately by the scale. This leaves U.S. buyers free to concentrate on a much more difficult and intangible factor—quality, ability to thrive, call it what you will.

It seems difficult to argue in favour of the U.K. method of selling per head—where weight and quality have to be estimated in a very few minutes. After all, to say that a bunch of steers cost, say, £65 per head means nothing. Buying price, in isolation, bears no relation to ultimate profit. It is only when it is associated with weight that it becomes important. The present method is, therefore, unbusinesslike. No farmer ever buys or sells an unknown amount of hay or corn; he deals in specific quantities.

## Per cwt or per lb

Sooner or later the outdated headage method of buying and selling beef stores must stop. It has already happened with fat cattle that claim a Government guarantee. Whether stores should be sold per live cwt or per live lb is a matter of opinion. We are fairly well accustomed to the cwt unit, but it has the disadvantage of being difficult to use when considering the liveweight gains per day. Here, we think in terms of pound—1½, 2, 2½ lb, as the case may be. It is also commonplace to think of 'lb' of food eaten per day. For the sake of uniformity alone it seems sensible to buy and sell cattle on the 'lb' basis as well.

The only foreseeable disadvantage is that if we enter the Common Market, then the metric system may eventually be adopted. Or, perhaps, it may be a compromise, like the U.S. method, where the cwt is 100 lb and a ton is 2,000 lb. We should then have the best of two worlds. The important thing, however, is that a unit of weight should operate; whether it be the 'lb' or 'kilo' is not particularly material.

When cattle are bought per head for immediate fattening, it is impossible to separate two very different skills. The first is the skill of buying in the market-place; the second is the skill of the fattening management. Maximum profit comes from good buying coupled with good management, but we need to isolate these. The feed-lot age demands as precise a knowledge as possible of how well or how badly cattle convert their food into beef.

Calves, when bought by the feeder, range from 6 to 9 months old and on average weigh 400–500 lb. Yearlings average 600–750 lb each and range in age from 12 to 18 months. Two-year-old cattle weigh from 800 to 1,000 lb and are 24–30 months old. If fed on concentrates and the animals taken to the same degree of finish, then, broadly speaking, calves will put on 400–550 lb, yearlings 400–500 lb and two-year-olds some 300–400 lb.

The amount of food consumed by each age group is quite similar. Generally speaking the daily gain of the older cattle will be greater than that of younger cattle. Likewise, they will eat more pounds of feed per day. Experiments from seven United States' trials bring this out.

TABLE 1

*Effect of age of cattle on amount of feed used to attain 'Choice' grade*

| | *Calves* *lb* | *Yearlings* *lb* | *2-year-olds* *lb* |
|---|---|---|---|
| Shelled maize | 2,735 | 2,696 | 2,811 |
| Protein concentrate | 452 | 405 | 372 |
| Dry roughage | 1,139 | 1,183 | 1,203 |
| Total | 4,326 | 4,284 | 4,386 |

But the influence of age upon economy of gain is a factor of considerable importance in a feeding operation. The figures in Table 2 show considerable variation due to age. It is a well-established fact that young cattle will produce more liveweight gain per unit of food than older cattle, because they utilize a higher percentage of it for growth and a lower percentage for fat production. More feed is required to produce a unit of fat than a unit of growth (bone and muscle).

TABLE 2

*Influence of age upon economy of gain throughout feeding period*

*Feed per cwt (100 lb) gain*

| | *Calves* lb | *Yearlings* lb | *2-year-olds* lb |
|---|---|---|---|
| 1st 100 days | | | |
| Maize | 431 | 534 | 597 |
| 2nd 100 days | | | |
| Maize | 623 | 916 | 1,085 |
| 3rd 100 days | | | |
| Maize | 529 | 702 | 798 |

(*Source: Nebraska Bulletin 229*)

Each succeeding unit of gain for each age group is likewise more expensive in terms of feed required. Table 3 shows the results of a U.S. study with costs for succeeding units of gain translated to shillings and pence ($2.80 = £).

TABLE 3

*Effect of length of feeding period on cost of gain of 'Choice' grade steers*

| *Gain* | *400 lb Calves* | *640 lb Yearlings* | *840 lb 2-year-olds* |
|---|---|---|---|
| | *s. d.* | *s. d.* | *s. d.* |
| 1st 100 lb | 93 2½ | 112 5 | 114 7 |
| 3rd 100 lb | 116 8½ | 153 1 | 179 11 |
| 5th 100 lb | 167 1 | 241 11 | 174 7 for 50 lb |
| 7th 100 lb | 234 6 | — | — |
| Total gain lb | 700 | 500 | 450 |
| Average cost 100 lb gain | 147 10 | 164 11 | 191 2 |

(*Source: U.S.D.A. Technical Bulletin 900*)

It is interesting to note how these tables support the price differences which operate in United Kingdom auctions for store cattle. Thus weaned calves generally sell at higher rates per cwt than older cattle, since they have a longer growth (bone and muscle) period ahead of them. This growth is relatively cheaply produced. Older cattle are cheaper to buy per cwt; and this is sense, for they only have fat to put on. This is a relatively costly process. For virtually the same reason, heifers are invariably cheaper to buy than steers of equivalent weight and quality.

## Conversion factors

It would be well, at this stage, to say something of the significance of such terms as rate of growth per day, lb of food eaten per day, and conversion factors, as they apply to fat cattle. Liveweight gain, within limits, can be what you want it to be—0 up to 3½ lb per day. It's useful to have such a figure, but the two important points are its relation to the amount of food consumed, and the cost of that food.

It is customary to relate daily gain and lb of food eaten by use of conversion factors, but these are of much less value, in isolation, with cattle than with pigs or broilers. Cattle can convert into beef a wide range of varied

feedingstuffs—from pure barley to a high silage diet. Conversion factors will be equally wide in range—from 5 : 1 up to 15 : 1, or more. The low rate is not necessarily the cheaper.

To bring various conversion factors to a common denominator, the conventional U.S. term is 'Cost per lb gain'.

So far there is very little British information expressed in this way.

Nevertheless perhaps an academic exercise might be attempted. Suppose a bunch of 7-cwt beef stores are bought in the autumn, put into yards immediately, with the intention to sell from mid-March to mid-May. Let us assume they cost £9 per cwt to buy and according to the current standard guaranteed price they will also realize £9. In other words, the exercise is to assess the farmer's skill as a feeder and nothing else.

Now £9 per live cwt, as the selling price, is equivalent to 19·3*d.* per live lb. This is what he gets for every pound weight that each beast puts on, and out of which he pays all expenses before getting any profit. Food is the chief item of expense, and as a target figure for British conditions at the present time it is suggested that 12*d.* per lb l.w.g. be considered. There is, therefore, a margin of 7·3*d.* per lb, after paying for food. Assuming, again, the cattle put on 300 lb over the fattening period, then the margin is equal to £9 2*s.* 6*d.* per head.

## Principles

Certain principles seem to emerge from studying a yard fattening operation in this way. First, store cattle should be bought and sold by weight, either per cwt or preferably per lb. Second, the buying price per cwt or per lb should, as a general rule, not exceed the anticipated selling price when cattle are yard fattened. Third, liveweight gain per day, although useful, is not an infallable guide to efficiency: efficient production depends primarily on the relationship between l.w.g. and the food costs incurred. Fourth, this relationship is best expressed by 'Cost per lb l.w.g.'; the figure of 12*d.* per lb is suggested for British conditions at the present time.

To repeat, the rock on which these principles rest is the weighbridge and scales.

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*Holdings in Thanet are gradually getting bigger and more efficient*

# Winter Cauliflower in Thanet

P. CLARKE

BEFORE discussing the cost of production and profit from a crop grown in a particular area, we should first consider the reasons why it is produced there; what is its place on the farm or holding as a whole in relation to other crops grown and how it fits into, or blends with, them in general.

If, for example, a crop can fit snugly into the vacancies left between the production of other crops grown and requires similar management, labour, etc., it could in fact show a book loss in itself and yet provide a profitable finish to the year's working on the holding as a whole, simply by making use of the slack. On the other hand, of course, a crop could show a substantial book profit but at the same time create a labour or other peak which may have to be maintained for the year, resulting in an overall annual loss rather than a gain.

*Harvesting team at work, with grading and packing trailer*

## As much mechanization as possible

Cauliflower growing tends to produce peaks, especially at harvesting; nevertheless as the climate is right for production and it fits in and blends with other crops grown, it has now become a major crop in the Thanet area, where it began in a small way about 1870. Its development was greatly speeded up by the introduction of the mechanical planter, introduced about 1938, so that today there are some 2,500 acres under cauliflowers in an area of less than 20,000 acres.

Holdings are gradually getting bigger and more efficient, but there are fewer of them (under 70 medium to large farms); smallholdings are comparatively few. There are many cases of over 100 acres of cauliflowers being produced by individual farmers; some are even carrying as much as 250 acres or more.

This trend may well continue, as engineers, and often the farmers themselves, develop machines such as planters, weeders and harvesting equipment to keep pace with expansion. Indeed, production is now mainly a mechanical job up to the point of harvesting, and here everything is done to ensure that manual labour only does what manual labour must do. A more even-maturing set of varieties might well help to solve this last, and very expensive, job.

## Favourable area

In Thanet the soil varies mainly from a sandy to medium loam, 1–4 feet deep, over chalk. It is very well drained, high in lime and easily worked in most seasons; in short very suitable for cauliflowers. It is, however, low in humus and potash, but these deficiencies can be corrected by good farming.

We have, too, a good geographical location, plus a reasonable kind of climate. The area is bounded on two sides by the sea and on the other by marshland. There are few trees, hedges and banks. Its closeness to the sea

keeps it comparatively free from frosts in general, but snow and icy winds can give us a very severe late winter. These cold winds can reduce growth to a standstill and may even cause severe loss, say one year in five. The annual rainfall for the area is low, 20 inches or so, which is perhaps a weakness, since the crops can suffer from drought on occasion. Sunshine is above average for the country.

The area is, of course, within easy reach of the large London markets—an important point with such a bulky crop, and one which should stand growers in good stead if competition from other areas becomes a possibility.

## Right quality at all seasons

Efficiency in production, management of labour and quality, plus a watchful eye on the middleman (transport and marketing costs), all these are essential for a profitable enterprise.

Under these favourable conditions efficient management has given Thanet growers both high production and high quality. The result has been profit and expansion, and a certain amount of control over transport and markets. But even with all these advantages, there are still many outside factors which influence profit or loss—factors that the grower can do nothing about. These may be as far apart as, for example, the yield of greenstuff, peas, etc., in other parts of the country, to the uncertainties of English weather.

The marketing season sees many of these effects (both peaks and troughs), and an average return for one season may be quite different from the next. Indeed, the periods of peaks and troughs for one season may very likely be reversed in the next, due to entirely different factors. Therefore it is important for the grower to have a good crop of the right quality at all seasons, so that he may get full benefit from the peak periods as well as the sales advantage which a continuity of production will give.

*'Gapping-up'*

## Costs of production

Set out below are details of the kind of direct costs per acre one would find most frequently in the production of winter cauliflowers on a typical medium-to-large Thanet farm where 40–50 acres or so of autumn and winter cauliflowers are produced during the season (September to June).

| *Purchases required* | *Quautity required per acre* | *Cost per acre* £ *s.* *d.* |
|---|---|---|
| Fertilizers | | |
| Organic manure—say ¼ of the acreage treated | | 5 0 0 |
| 12 : 12 : 18 or similar (price depending on time of purchase and quantity) say | 7 cwt | 6 14 0 |
| Nitro-Chalk (top dressing) or similar, say | 6 cwt | 4 4 0 |
| Dieldrin dip (plants) say | | 4 0 |
| Depreciation on plant, carting boxes, say | | 5 0 |
| 2,000 gallons of water at 2*s.* 3*d.* per thousand | | 4 6 |
| Spraying material, say | | 3 10 0 |
| Cost of plants produced on farm to pulling stage (1 acre to plant 32 acres) | | 2 18 6 |
| TOTAL | | £23 0 0 |

| *Time o year* | *Operations* | *Labour 4s. 8d. per hour* hr | *Labour 3s. 7d. per hour* hr | *Machinery (T hours) 4s. per hour* hr | *Cost* £ *s.* *d.* |
|---|---|---|---|---|---|
| June–July | 5 cultivations | 3 | | 3 | 1 6 0 |
| ,, ,, | Manure distributing | 1 | | 1 | 8 8 |
| ,, ,, | Pulling plants | - | 8 | - | 1 8 8 |
| ,, ,, | Transport of plants | 2 | | 2 | 17 4 |
| ,, ,, | Carting of water | 2 | | 2 | 17 4 |
| ,, ,, | Planting | 14 | | 2 | 3 13 4 |
| Aug.–Sept. | Spraying 3 times | 3 | | 3 | 1 6 0 |
| July–Oct. | Cultivations 5 times | 10 | | 5 | 3 6 8 |
| Jan.–Mar. | Top dressing (twice) | 3 | | 3 | 1 6 0 |
| | TOTALS | 38 | 8 | 21 | £14 10 0 |
| | *Harvesting operations* | | | | |
| Mar.–June | Cut, trim and pack 8 times (400 boxes) | 90 | | 9 | 22 16 0 |
| | Hire of 400 boxes at 9*d.* + 2*d.* cartage home | | | | 18 6 8 |
| | TOTALS | 90 | | 9 | £41 2 8 |
| | The above costs per acre (400 bushels packed at gate) = | | | | 78 12 8 |
| | or, per bushel packed at gate = | | | | 3 11 |

In preparing the detailed costings given opposite, the following points should be noted:

1. No allowance is made for rent, depreciation of basic farm equipment buildings, management costs and other overheads or for approximately £600 worth of special equipment used in the production and harvesting of say 50 acres of this crop.
2. Costings stop at the point of the loaded transport to market, using returnable bushel boxes, for which a charge of 9*d.* per box has been made plus 2*d.* for cartage London to farm.
3. Only winter cauliflowers are costed.
4. The total unit of production = say 25 acres, with 25 acres of autumn cauliflower to keep labour and overheads fully employed.
5. The yield per acre is taken as 400 bushels as follows: say 330 × 12 and 70 × 16 heads per box.
6. No allowance is made for the occasional total loss of crop due to exceptional severe winter or disease, but improved pest control should help to reduce some of these losses in future.
7. One acre of seedbed to plant 32 acres or so, raised on farm.
8. Transplanting is done with a 4-unit transplanter and all plants are watered in at time of planting.
9. Humus is maintained by way of discing in straw after combining or by applying seaweed, shoddy, sludge or farmyard manure, say on ¼ crop each year.

In the case of costings for *autumn* cauliflower, the figures are similar, with minor variations; as, for example, the base fertilizer may be increased to 8 cwt, but then the top dressing would be reduced to something like 4 cwt. This would have little effect on total cost. The price realized at market, however, is generally lower, but of course the crop occupies the ground for a shorter period.

## £70 an acre profit

Generally, when considering profit from autumn and winter cauliflower as a whole, you should be able to see a return of 3*s.* 11*d.* per box at 400 boxes per acre, or £78 12*s.* 8*d.* per acre plus, say, 1*s.* 7*d.* per box to cover transport and marketing costs, bringing the direct cost up to, say, £110 per acre to cover production, harvesting and marketing. In addition, rent, depreciation, etc., as mentioned in 1 above, must be covered and some allowance made for crop loss as mentioned in item 6.

The gross revenue per acre (past five-year average) equals £180 or 9*s.* per box, but this period did not include one of the very bad years, as mentioned in item 6.

The average profit for the crop from a well-run farm would appear, therefore, to be round about £70 per acre. Rent, depreciation, etc., and crop loss, as mentioned in items 1 and 6 above, must of course be deducted from this figure.

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**Nigel Harvey** *summarizes the findings of recent field studies on the buildings and equipment used for self-feeding on dairy farms*

# Fitting-in Self-feeding

WITHIN three years the number of English dairy farmers using self-feed silage methods has risen from 2,500 to 7,000, and for every milk producer who has adopted the practice there must be several weighing its pro's and con's. In particular, many will be turning a thoughtful eye on their buildings and wondering how best they could adapt them to the new technique. Such farmers can benefit from the experience of their neighbours, for in the last year or two a number of research workers have studied the various types of self-feeding systems and installations found on commercial farms and published detailed reports on them.

There have been five such surveys, covering between them more than five hundred dairy farms. The investigators worked in different ways in different areas at different times. But they all had the same aims—to discover what was happening and learn the causes of success and failure. And they all tell the same general advisory story. What is that story?

## Housing for ready access

Let us start at the beginning. The first requisite is a yard, for the cows must have ready access to the silage. It is possible, but seldom satisfactory, to self-feed a herd housed in a byre. For one thing, a large loafing area in front of the silage is necessary to allow all the animals to eat their fill, and the work of cleaning this area greatly offsets the saving of labour secured by introducing the self-feeding system. For another, the cowhouse system implies restricted access to the silage and this may favour boss cows unduly. But, of course, this does not necessarily mean that the herd has to be milked in a parlour. It can be housed in a yard and milked in a cowhouse or in a bail.

A common system is a covered yard continuous with an uncovered loafing area leading to the silage clamp. Incidentally, because the cows spend much of their time feeding or standing around in the loafing area, you may not need as much straw as you would with a conventional yarding system. One investigator reported a reduction of as much as 40 per cent in straw consumption after introducing self-feeding.

## The clamp

The second requirement is, of course, the silage clamp. The surface clamp with walled sides is the most common type, and the majority of farmers prefer sloping to perpendicular sides, since this ensures better consolidation and less risk of air spaces which may cause overheating. A slope of one foot in six is a commonly quoted figure. The silo should be floored in concrete laid to a drainage slope up and away from the cows. In general, the settled height of the silage should not exceed 6 ft, the maximum height at which cattle can reach it. Silage above that height must be thrown down by hand. Besides, height increases density at the lower levels and makes it more difficult for the cows to pull their meals free. Consequently they tend to eat less.

About three out of four self-feeding silos stand under a roof, generally under the roof of a Dutch barn. A number of farmers, however, seal their silage, whether under a roof or not. Straw, lime and chalk are the materials most widely used, though the use of plastic sheeting has been gaining ground markedly in the last year or two because it requires little labour. But sealing silage, whether roofed or unroofed, seems to be less common than it used to be, and studies suggest that the wastage of unsealed silage is small, provided the top layers are well consolidated.

## Keeping the forecourt clean

The unbedded approach to the silo or, as it is sometimes called, the 'forecourt', requires particular attention, for it is here that dung, mud and water collect to form a peculiarly unpleasant slurry. And this, in extreme cases, may discourage cows from feeding properly. Moreover, figures show that on average about half the man-hours used on running the system are spent on keeping this area clean. So false economy or other mistakes in its design or construction can make a painful difference to the efficiency of the system in general and to labour costs in particular.

The reports emphasize the need of a concrete floor—tarmacadam is difficult to keep clean, and clinker cannot stand 'heavy cows and heavy rain' —with proper drainage slopes falling away from the silage. The best way of handling the slurry which collects on this floor is by squeegee or scraper, preferably mounted on a tractor. But remember that mechanical cleaning needs careful planning—figures from one sample of farms show that mechanical cleaning required on average as much time as hand cleaning. This *may*, of course, have been the result of abnormally efficient hand-cleaning systems. More likely, however, it was due to bad planning of the mechanical systems. You have been warned.

Some farmers sweep the slurry into a walled storage area, where it dries and so becomes easier to handle. Some spread it directly on the land, if possible using the natural slope of the ground or a ramp to raise it to a level from which it can fall into a spreader. Some use it in organic irrigation systems. Every farmer must develop his own particular answer to his own particular needs. But every farmer thinking about adopting self-feeding should realize the importance of this problem. It is possible to spend almost as much time handling slurry as handling silage.

## At the silage face

To get the maximum saving of labour and to ensure that each cow can eat its fill, most farmers allow their herd 24-hour access to the silage. Others, for various reasons, restrict the amount of time the cows can spend eating. This, of course, is a matter of management, not of building design. But it greatly affects building design, for it determines the amount of space allowed per cow at the silage face.

If access is restricted, sufficient space will be required at the silage face for all the animals to eat at the same time—say, 2 ft 6 in. per head. It seems, however, that this can be reduced to 1 ft 6 in. if the cows are allowed access to the silage for 12 hours or more in the twenty-four. But if the cows are allowed access to it all round the clock the allowance per head is measured in inches. Experience on one farm suggests that as little as 4 to 6 inches per head may be sufficient for cows of small breeds eating silage made from lacerated grass which is easy to 'graze'. But most farmers allow between 7 and 10 inches. Nine inches per head seems a reasonable standard figure.

It is generally claimed that an unfenced silage face means wastage, for the cows trample low sections of the face and burrow after the more palatable parts of the silage, so causing loss from dropping and from the development of mould on over-exposed sections. This opinion was not supported by one study, which did not find that wastage decreased when a fence was used. In practice, however, most farmers fence the silage face, usually by means of an electrified wire or pole 2 ft 6 in. to 3 ft high and 1 ft from the silage. Some, however, prefer a rigid fence of wood or metal. Such a fence should be light and easy to move, for few farm jobs are less pleasant than man-handling a heavy fence on a slippery floor in an area dedicated to cows and silage.

About one farmer in three provides artificial light at night at the silage face. This was found to increase the amount of food eaten, though not the amount of milk produced. Nevertheless it was suggested that such lighting may be necessary to encourage the more timid cows, particularly those which are frightened away from the clamp in daytime by their more aggressive sisters. It may be necessary, too, if electrified wiring is used as a fence at the silage face. Otherwise, fear of the unseen but painful barrier may prevent cows from eating in the hours of darkness.

## Saves time and labour

So there are quite a lot of points to consider in each of the different component parts of the self-feeding system. There are quite a lot more in planning and installing the system as a whole, particularly if an existing farmstead is being adapted to the new purposes. And, here as elsewhere, the findings of the research worker can give no more than guidance. The farmer must still make his own decisions in the light of his individual circumstances. But he may be encouraged on one point by the unanimity of farmers who use self-feeding. They all agree that it uses less labour than traditional methods.

Thus in one survey every farmer questioned put the reduction of labour first on the list of benefits he had derived from adopting the system, and various reports emphasize the relief of farmers and farm-workers alike at the end of the literally stinking job of cutting and carting silage. The figures

for the amount of labour saved differ in detail and presentation. One study found that the average time for feeding a 32-cow herd was reduced from over two man-hours a day to about half a man-hour a day; another that the labour requirements per cow per winter were reduced by 15 per cent; a third that the labour requirements per cow per year were reduced by 17 per cent. But whatever the system of measurement, the conclusion is the same. Self-feeding saves time. And anyone who has ever handled silage will not need figures to tell him that it saves trouble as well.

*On a Northumberland farm advantage has been taken of a natural slope to build a slurry pit opposite the entrance to the silo. This is an operation which needs the greatest care. For safety's sake a handrail, or perhaps a railway sleeper, could be fixed firmly from the wall across the opening to the post, and at a height just below the top of the blade. If this were fitted directly over the pit edge, most of the slurry would be pushed into the pit and a man with a shovel could complete the job*

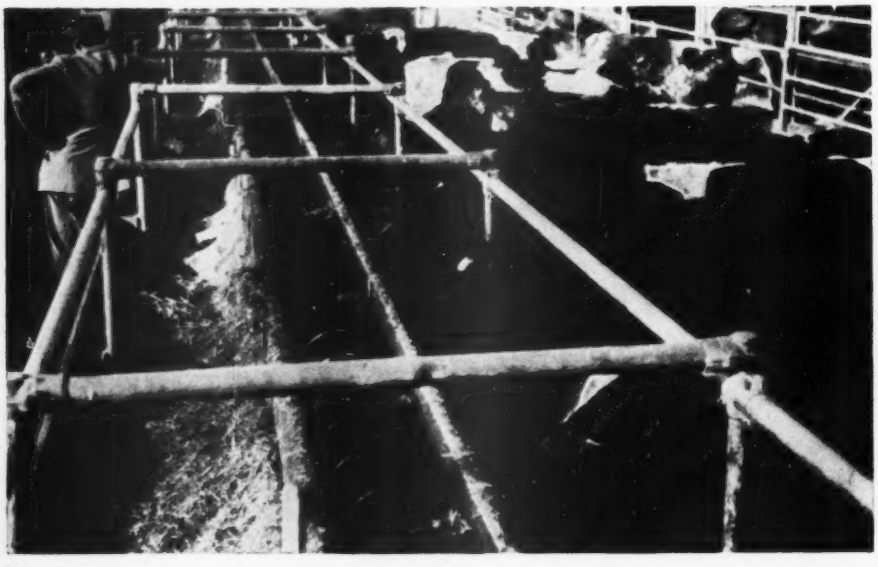
*Continuing last month's article on haylage*

# The Feeding Value of Haylage

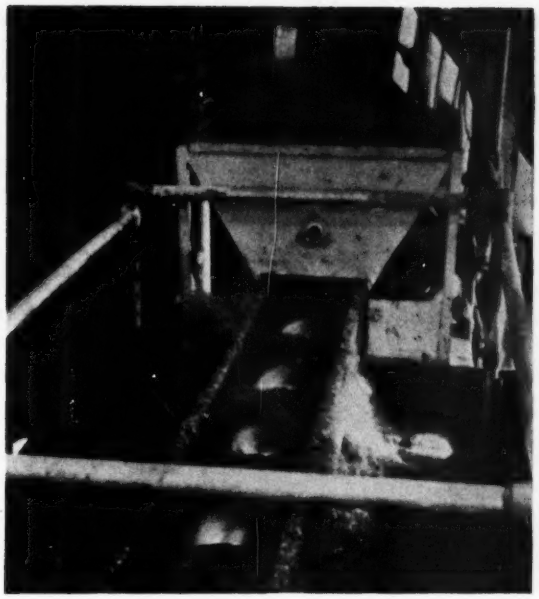
**Phyllis Farmer**

THERE hasn't been much experience of feeding haylage in this country so far. In view of its high dry matter content, stock should certainly be able to obtain a higher dry matter intake from it than would be possible with wetter silage or unwilted material. Silage crops cut early in the season have a higher digestibility and feeding value than crops cut at a mature stage of growth, so that where haylage is made from young, leafy material, it should ensure a worthwhile saving of concentrates in the feeding of dairy herds. With beef cattle, too, it could reduce the amount of concentrates fed. No hay will be needed when haylage is being fed.

*Auger carries haylage into feeding yard*



*The conveyor belt takes haylage from unloader to feeding trough*



## Samples analysed

A few samples of haylage have been analysed from farms in the south-west region during the winter and the following results obtained:

| | *Braby tower silo* | | | | *Harvestore silo* | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| *Crop* | *Perm. pasture* | *Ley* | *Perm. pasture* | *Perm. pasture* | *Kale and barley straw* | *Ley* | *Ley* |
| Dry matter (%) | 52·3 | 39·7 | 29·5 | 41·9 | 43·3 | 33·4 | 45·4 |
| Crude protein (%) in dry matter | 10·4 | 15·2 | 15·5 | 10·1 | 10·1 | 7·7 | 10·0 |
| Crude fibre (%) in dry matter | 27·4 | not determined | | | 33·9 | 30·7 | not determined |
| Type of fermentation | satis-factory | good | sl. over-heated | good | well made | good | good |
| pH | 7·4 | 5·7 | 4·4 | 4·3 | 4·1 | 3·8 | 4·5 |
| Est. S.E. | 23 | 19·8 | not | 17 | 16 | 18 | 18 |
| Est. P.E. | 2·7 | 4 | calculated | 2 | 2·4 | 1·2 | 2·9 |

(The high pH values of samples 1 and 2 were probably due to delay in transit and also to the fact that they were taken shortly after filling; subsequent samples from the same silo were satisfactory.)

A crop of wilted oats and tares ensiled in an air-tight tower on one of the Ministry of Agriculture's Experimental Husbandry Farms had the following analysis when fed: dry matter 42·9 per cent, crude protein in dry matter 11·2 per cent, pH 4·2. The dry matter losses during storage were reported to be 4·6 per cent.

Where haylage of comparable quality to that of sample 2 is available, 50 lb per head daily would provide sufficient nutrients for daily maintenance and the production of 1 gallon of milk for Friesian cows. Crushed cereals or dried sugar beet pulp nuts could be fed instead of balanced concentrates

at the rate of 4 lb per gallon for the second, third, fourth and fifth gallon of milk produced, since there would be protein from the haylage in excess of requirements. If plenty of haylage were available it would, of course, be possible to feed more, and about 75 lb would provide for maintenance and 3 gallons, with sufficient protein for an additional 2 gallons of milk. With high yielding dairy cows, it would be preferable to restrict the amount fed, because otherwise they might be unable to consume their full allowance of concentrates.

On a farm visited recently, beef calves of about 4 cwt live weight were being reared on 30 lb haylage with 2 lb barley meal daily. They looked in remarkably good condition. Some of them had been weaned abruptly at just over 6 weeks of age and, after an initial set-back due to overeating the haylage, had done well.

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# The Ministry's Publications

Since the list published in the December, 1962, issue of *Agriculture* (p. 447) the following publications have been issued.

## MAJOR PUBLICATIONS

*Copies are obtainable from Government Bookshops (addresses on p. 50), from Divisional Offices of the Ministry or through any bookseller at the price quoted.*

### BULLETINS

No. 77. Tomatoes (Revised) 7*s.* (by post 7*s.* 6*d.*)
Rewritten to incorporate recent advances resulting from research and experimental work, particularly in temperature control and mechanization. Useful to both the established grower and the beginner. Well illustrated.

No. 190. Outdoor Flowers for Cutting (New) 5*s.* 6*d.* (by post 5*s.* 11*d.*)
The first of a new series on commercial flower production, dealing principally with propagation and culture of annuals, bi-annuals and perennials, and methods of marketing.

## LEAFLETS

*Up to six single copies of Advisory Leaflets may be obtained free on application to the Ministry (Publications), Ruskin Avenue, Kew, Richmond, Surrey. Copies beyond this limit must be purchased from Government Bookshops, price 3d. each (by post 6d.).*

### ADVISORY LEAFLETS

No. 169. The House Sparrow (Revised)
No. 461. Stem and Bulb Eelworm on Tulips (Revised)
No. 517. Avoiding Losses in Calf Rearing (New)

### FARM MACHINERY LEAFLETS

No. 1. Mowers (Revised) 6*d.* (by post 9*d.*)

# 57. Nidderdale, Yorks W.R.

**J. Tasker**

THERE are close on a million acres of farm land in the West Riding of Yorkshire and no matter which way it is traversed there is an ever-changing scene both geographically and agriculturally. Contour, altitude, climate, soil type and proximity to markets all play a part in the choice of enterprise. Although the area under review comprises only a fifth of the Riding, the same varied pattern exists.

If we start our journey in the north-west, where the scenery is picturesque but the farming potential low, our progress will be in the right direction agriculturally speaking, for we shall be improving as we go. This is an upland area, centred on Pateley Bridge, where valleys alternate with hills, rising ultimately to 2,000 ft and more. The region is dominated by thousands of acres of open moorland, swept by bleak winds and grazed by Swaledale and Dales bred sheep and their crosses produced by Wensleydale or Teeswater tups. Here you can walk for miles with only the bleating of sheep, the cry of the curlew and the strident chattering of grouse for your companions. Isolated farmsteads, perched in the shelter of the hills and approached by meandering track-like roads, are the rule; but more happily situated holdings are occasionally to be found in the villages.

Each farm has a small acreage of in-bye land with grazing rights on the moors. Farming is restricted by the nature of the terrain, with its heather and nardus moors, steep banks and outcrops of rock. Climate, too, plays a part, the high rainfall being collected from the water-gathering grounds which form a considerable part of the area and harnessed into usefulness to supply water to large towns. As a consequence, farming activities are limited in the interest of those who ultimately use the water.

The soil is inherently acid and short of phosphate and this, coupled with the high rainfall, makes a sound liming and fertilizer programme imperative. The herbage is slow to start into growth in the spring and gives up early in the autumn. Arable crops, except in the valleys, are a hazardous undertaking, being confined mainly to small areas of kale or sheep mixtures. The hay crop is of utmost importance but often difficult to win and, as a result, silage-making has made considerable strides, especially where a dairy herd is kept.

Since dairy farming is the main enterprise, grassland improvement is essential to allow increased stocking. The Marginal Production Assistance Scheme enabled considerable progress to be made in this direction. This is now being built upon under the Small Farmers' Scheme, and the improvement is already apparent, even to the untrained eye. Some of the farms rear their

own herd replacements. In the higher dales, where the farmers are traditionally skilled with sheep, rearing of beef calves is increasing as an additional enterprise. These calves are exported to the lowlands, where they find a ready market.

The holdings, being mainly family concerns, are not subject to labour problems to the same extent as the lowland farms. Mechanization is limited to a tractor, a muck-spreader and machinery for the conservation of grass as hay, silage or both. It is a tough life, but most of the occupants know no other.

As we leave this district, once the centre of a prosperous lead mining industry, and journey eastwards towards Ripon, we pass through a more genial area of upland grassland farms before reaching a mixed farming zone lying in a triangle formed by Ripon, Boroughbridge and Harrogate. Easier contours, a more equable climate and richer soil change the agricultural scene quite strikingly. Dairying is still important and sheep still have a place, though the breed has changed. But arable crops outnumber grass fields and beef cattle appear on the scene.

The soil is of a free-working, gravelly nature, though there are pockets of strong land here and there. Wheat, barley and oats are much in evidence, whilst potatoes and sugar beet constitute the cash rootbreak. Even though fodder roots are still favoured on some farms, a system of ley farming is well established. Farm size is on a more economic scale, with fixed equipment relevant to the enterprises pursued.

Our road now turns south-east towards Wetherby and beyond. The rivers Nidd and Wharfe flow through the area, and the salient agricultural feature is the Permian Magnesian limestone ridge which runs transverse to the valleys. Extending for a good many miles, along the route of the Great North Road, it gives rise to excellent arable farms. More cash cropping is to be seen, with sheep and bullocks as complementary enterprises.

The Vale of York lies to the north and east of the limestone ridge. Here the parent material is mainly Bunter sandstone and, northwards, alluvium, producing good working soils but with variations in texture. The farming is similar but the return smaller. Several pedigree dairy herds share pride of place with the fattening of home-reared and Irish cattle as major stock enterprises.

On the western side of the region there is a belt of strong land, derived from Millstone Grit, giving rise to a poorish soil which is mostly farmed as grassland for the production of milk. Leeds lies at its southernmost tip, but here coal measures begin and market gardening flourishes, with rhubarb and broccoli the important crops.

We have now reached our journey's end, and although we would have preferred to meander over the hills, down the valleys, along the river banks and through the rich corn lands, we have of necessity had to travel all too quickly. As a result, many smaller facets of the agricultural scene have been passed by with no more than a casual glance, and not always that. Amongst the 3,455 holdings in the area there are intensive pig and poultry enterprises, small progressive dairy farms and small intensive holdings where production is prodigious and puts to shame the results which are obtained by some of their larger neighbours. These have all been swallowed up in the general picture, but their contribution is a valuable one and of fundamental importance to the industry as a whole.

C. ROBINSON
*Agricultural Land Service, London*



# The Safety Factor

TEN people died and 1,233 were injured in accidents in and around farm buildings in 1961. What this meant in terms of personal suffering cannot be assessed. Nor is the cost in money known. But, unquestionably, there was loss to all concerned.

Something over one-half of farm labour is employed in and around buildings. There we find a mixture of manual effort and mechanization, both involving risk to the unwary. A good deal can be done to limit, and in many cases eliminate, this risk.

Old buildings, new buildings—some strong, some weak—can be found in most farm homesteads. Cramped conditions and inadequate natural light characterize the old; and often machinery stands in dark corners, with insufficient space for it to be operated safely.

It is a human failing to overlook the things around us, particularly those we see, or should see, every day. In this way age and neglect combine with wear and tear to create hidden dangers. Stairways and step-ladders are obvious examples. Woodwork decays, masonry becomes loose, and the treads, whether of timber, brick or stone, become so worn that it is hardly safe to put a foot on them.

Improper or thoughtless use of buildings is another common danger. Every year death and injury are caused through buildings being overloaded with grain. There is a limit to what loaded floors will carry, and it is no good thinking that the timbers look big enough to carry a bit more than they did last year. Size alone is not a safe measure. The span and the bearing must also be considered, and the strength of any supporting pillars. The old bit of timber pushed under the floor as a 'safety measure' last year is a poor safeguard—and it may be no safeguard at all. You may get away with overfilling for a long time but sooner or later something will give way, with the possibility of death or injury to men or animals; if nothing worse, you will certainly have an expensive mess to clean up. You won't recover all your corn, and any wheat you manage to salvage may be wholly or partly unmillable, so that your deficiency payment may be reduced or lost altogether.

It seems unnecessary to stress the dangers from livestock in buildings, and yet there are hundreds of such accidents every year. We all know animals are capricious, so the blame will not lie entirely with the buildings. But we should see that our workers are able to look after livestock in safety. With many older buildings a man has to go into the cattle yard to deliver food and so is

constantly at the mercy of the animals. In most of these buildings a simple and inexpensive working area could be provided, enabling the cattle to be fed without the man having to go into the yard.

Though there are far fewer bulls on our farms than there used to be, they are still causing injury and death to farmers and their workers. Familiarity can breed contempt, and a worker may unconsciously become complacent or even bold in his attitude to a bull which he may have reared from a calf. Even when tied up, a bull can still be dangerous; 19 people were injured in 1961 by bulls which were tied up at the time. We should see to it that the building and yard provide the greatest safety for a man in his work, and this can be done for a reasonable price in relation to the value of a human life (see Fixed Equipment of the Farm Leaflet No. 16, *The Bull Pen*).

Our new buildings do offer greater safety through stronger materials and more light, but even they must not be misused. Don't hang things on roof trusses or use a tie-beam as a crane-jib. And don't fix motors and shafting to the roof members without first getting advice from somebody properly qualified to give it.

Many accidents occur through carelessness or thoughtlessness in guarding against them. For this reason a safety code, reinforced by legislation, has grown up in manufacturing industry, but only in the last few years have safety regulations been extended to agriculture (the Workplaces Regulations came into force as recently as 1st April, 1961). These cover the more dangerous things, like stairways and openings in walls and floors, and their requirements are sound common sense. Advice about these Regulations and whether your farm complies with them can be obtained from the Ministry's divisional offices.

In *new* buildings the safety factor is usually properly taken care of, particularly where they are designed and erected by skilled people. But a fair amount of building work on farms is carried out without the benefit of such skill. Many farmers have erected admirable buildings, but unhappily there are also many examples of work which is little short of a menace. It is foolish to save a little on the cost at the risk of a disaster. The services of a professional adviser and the employment of reliable contractors can well save money in the long run—and leave you free of the nagging fear for the safety of the buildings and their occupants.

The same applies to electrical installations. In the last fifteen years electricity has been introduced to many farms. It was used mainly for lighting at first, but with the growing acceptance of its usefulness in modern farming, it is now being more widely used for power. Extensions are often made by people both unqualified and inexperienced, with constant risk of fires, injury and even death. In two years to 30th September, 1961, eight people were injured by electricity on farms but twelve people lost their lives. This is a serious warning that, with electricity, you don't usually get a second chance.

If there is a moral in all this, it is that we should make a practice of looking over our buildings from time to time to keep them safe through good maintenance. This can save money and bring peace of mind. Now is the time to do it, when the rush of the year's work has died away. It is also the best time to get a contractor for jobbing work; next summer he will be much too busy on bigger jobs.

# Board or Free Market for Meat?

*Reported by* ***Sylvia Laverton***

THE pro's and con's of establishing a Meat Marketing Board were debated in lively style at the Farmers' Club on 12th December. Putting the case against a Board, MR. KEITH KILLBY (a director of the firm of P. W. & J. K. Killby of the Central Markets, Smithfield) wondered whether he had been chosen as being 'one to make the sparks fly'. He lived up to this reputation by placing the blame for last summer's collapse of the beef market fairly and squarely on the farmer, for throwing an unduly large amount of stock on to the market at a time when consumption tends to fall.

But his primary concern was to promote greater mutual understanding between farmer and butcher. 'The retail butcher is a very important person for the farmer', he said. 'He does a very good job for you. If the supply of stock off the British farm was as even in quantity and quality as that out of a factory, there would be much less for us wholesalers to do'. In fact, the range in type of meat animal produced is very wide. There are twenty-four breeds of sheep and twenty of cattle, and all are bred and fattened in a variety of ways. 'I defy any person or body to devise a grading system whereby there can be a national payment for stock which would ensure that the farmer who produced the quality beast would invariably be paid the money his stock is worth', declared Mr. Killby. 'It is the sharp edge of competition that ensures that meat in its complexity finds its right market. I believe no set of Civil Servants could do the work as well, and as economically, as it is now done under private enterprise'. Smithfield Market, the largest meat market in the world, operates on a 4 per cent gross margin. Could any nationalized trading body work as efficiently and at such low cost?

He was, therefore, completely opposed to the idea of the trade being run by a Meat Board possessing sole purchasing rights in the farmers' livestock, however exercised. He was equally opposed to a similar monopoly control of the stages of processing and sale to the public. But he thought a non-trading body with some advisory and carefully considered statutory powers, drawn from both sides of the industry, could with advantage largely take over some functions which are now the responsibility of the Government or other authorities. Such a Board would aim at a more even supply of home-killed meat, by control of subsidies; seek to co-ordinate supplies of imported and home-killed meat; co-ordinate research into production, marketing and

consumption so as to ensure that improvement in one direction is not detrimental in another; encourage improvement and ensure maintenance of quality standards; and advertise meat.

'We in the meat trade will, because of the competition maintained in that trade, modernize and streamline our marketing of your meat produce as fast as you, the farmers, rationalize its quality and quantity', he promised.

MR. JOHN R. HARVEY, a Wiltshire farmer and Chairman of the Hampshire N.F.U.'s county executive, then spoke 'for' a Board, contending that there are few products whose marketing today is as chaotic or archaic as meat . . . 'the field is wide open for development and reorganization'. Farmers supply the product to begin with, and are therefore fully entitled to organize the marketing of it, he said. We have today a very large number of individual producers selling to an ever-lessening number of primary buyers. It is clearly the producer's responsibility to reorganize his side of it before it is too late. He added that less than 400 of the 3,000 or so slaughterhouses in this country attain the throughput considered economic by the Inter-Departmental Committee—4,200 cattle units a year—and suggested that the waste of national resources and human effort in the slaughtering and transport of meat puts the industry a hundred years behind the times.

Clearly, he said, a Board to control all meat from farm gate to shop counter could never come about, but 'I can see no reason why anyone other than the farmer and a Meat Board should have any dealings with the beast until it becomes a carcass of meat'. He advocated that a Marketing Board, composed of representatives of producers, 'and wholesalers, if you wish', should be set up to control the procurement, transport and slaughter of all fatstock. It should be exclusively the farmer's agent in the market, selling the produce to buyers who may be processors, manufacturers or distributors, slaughtering being done eventually at 200–300 modern meat factories sited at convenient centres in producing areas.

The Board would be able to establish a national price for each type of product, according to demand; hygiene and full utilization of valuable by-products would be assured; there would be big savings in transport and handling charges; ultimately cold storage could be provided to remove marginal surpluses from the market; and home-produced meat could be advertised effectively. Also, grading would be brought into line with demand and a much wider basis of distribution of types of carcass organized to meet local demand. The present grading system bears no relation to the ultimate value realized by the carcass. 'Quality surely must be defined as the type of product for which the public is prepared to pay a premium price. Today, a grade B carcass often realizes as much on the retail market as a grade A.'

According to Mr. Harvey's scheme, there would be no question of monopoly, nor would the Board be involved, financially or otherwise, in the very complicated business of retailing meat. As for import control 'the Government must accept its responsibility and provide adequate anti-dumping regulations'.

'If the Government would allow the producers every facility for setting up a Meat Marketing Board on the lines I have suggested', declared Mr. Harvey, 'it is my sincere belief that, when the Board became fully operative, the fatstock subsidy could be virtually abolished'.

# IN BRIEF

### Trouble with Redskins

What appears to be a new disease in certain crops of Redskin potatoes is being studied at the Ministry's Plant Pathology Laboratory. Affected stocks give low yields with some misshapen tubers. These are coarse and elongated, with numerous eyes which extend towards the heel-end of the potato. The eyes are prominent, with an exaggerated brow. When the trouble is severe the tubers may be small, varying from the size of an egg to that of a marble.

The cause may be a virus, and it is important that all suspected tubers are found and used as ware and not planted. Potatoes should not be grown again in the same field as suspected tubers while any groundkeepers (or self-sets) remain to infect the subsequent crop.

### Polythene Sheeting

The tremendous possibilities of polythene sheeting for use on farms and in market gardens and nurseries is well brought out in a new film released by I.C.I. As waterproof covering for ricks, root clamps, silage and field-stored fertilizer, it offers a considerable saving in time and, in many cases, a more efficient job than other, traditional materials. A rick for instance, can be covered in 1 to 1½ hours. Properly laid and securely fixed, the sheeting will defy wind and rain to preserve the product in 'mint' condition.

This kind of sheeting can also be used as effective cladding material on farm buildings, e.g., poultry houses and shelters for yarded animals. Made as a thin membrane, it is useful for damp-proofing floors before concreting.

In horticultural practice it offers a ready use on glasshouses, as movable structures and tunnel clochés, and is claimed to be cheaper than glass.

Polythene sheeting is available in clear and opaque forms, according to the particular need.

The film (16 mm. Eastman Colour, running time 25 min) is called *Farming with Polythene Sheeting*, and can be borrowed free from the I.C.I. Film Unit, Imperial Chemical House, Millbank, London, S.W.1.

### Orchard Fruit Census

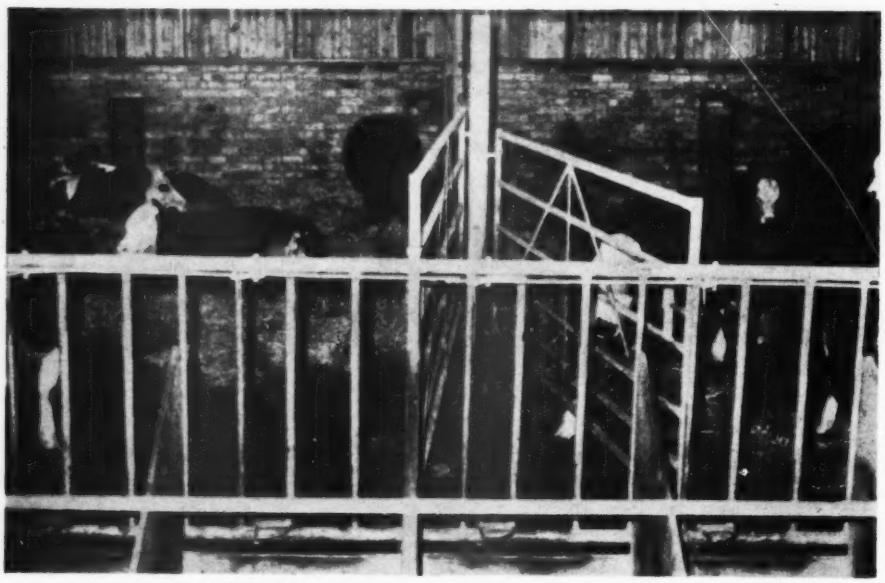
Early in 1963, between mid-January and mid-February, a selected number of fruit growers (about 2,000) will be asked to co-operate in replying to a detailed questionnaire concerning the age of orchards, production, and methods of marketing, grading and packing. Field Officers of the Ministry will visit each of these 2,000 growers to help them with the questionnaire.

In this way it is hoped to gather information which is of particular importance to the Government and to the industry at the present time.

## Treble-purpose Gates for Cattle Yards

Double gates which form part of the fence between cattle yards at Boots Farm, Thurgarton, Nottingham, serve a number of purposes. They save straw by providing an area for twice-weekly cleaning down. They provide easy access for the yearly clean-out. And they provide a quiet and trouble-free corridor for the cattle to pay their regular visit to the weighing machine.

As cattle are concentrated more heavily in winter feeding yards, it becomes a major problem to find enough bedding for them. One solution is to avoid the need for bedding straw altogether—the slatted floor; another is to concentrate the bedding on a small area of the yard and have slats as the floor for part of it.



By the use of the double gates, a third solution has been developed in the new nutrition experimental building at Thurgarton. Two-thirds of each yard is bedded and the third nearest to the mangers is left as bare concrete. This needs cleaning down periodically, as most dung is dropped close to the mangers at feeding times. So, twice a week the gates which serve as part of the fences between the pens are folded back to retain the cattle in the rear two-thirds of each yard. This gives the tractor scraper a straight run through a set of four yards.

This scraper pushes the slurry out to a collecting area, where it is loaded directly on to trailers and taken to A-shaped muck-heaps for rotting down into manure fit for applying to grassland. For this bi-weekly cleaning, the cattle are left undisturbed at the back of their yards. Equally, when the complete yards are cleaned out once a year, the gates give full access to each pen for the tractor fore-loader.

For their third purpose, the double gates form corridors to the cattle crush and weighing machine for the periodic handling necessary with experimental work. They enable the cattle to move, one pen at a time, with complete quietness and confidence.

## Pigs: Atrophic Rhinitis

Atrophic rhinitis is no longer notifiable under the Diseases of Animals Act, 1950. It has been removed from the list of dieases for which a slaughter policy is enforced.

The number of outbreaks of this disease of pigs in Britain has steadily declined over the last few years, and none has been confirmed since September, 1960. Such

future control as may be necessary, it is believed, can be maintained by ordinary intelligent culling.

Atrophic rhinitis was first confirmed in this country in 1954. The early symptoms of the disease are sneezing and snuffling, leading in some instances to progressive deformity of the face.

Experience has shown that the disease does not cause undue losses or have any significant effect on growth or food conversion rates, and that it is not of such economic importance as had been feared.

## Minimum Temperatures for Housed Livestock

It costs over four times as much to keep an animal or bird warm by feeding concentrates in the form of an 'internal fuel', as by using one of the commonly used external fuels. This was one of the points made by Dr. W. B. Sainsbury at the London Conference of the Electrical Development Association. He wondered how many farmers appreciate this when they allow the house temperatures to drop below the lower critical temperature.

In the British Isles there is justification for using heat with calves, piglets and some fattening pigs, and poultry to keep the temperature above the lower critical value. In other cases the warmth is either not needed or the stock may provide it themselves. Indeed, the latter is generally true with fattening pigs, but in some cases, as in weaner houses, some space heating is needed, particularly in the first stages.

Dr. Sainsbury is of the opinion that in our changeable weather it is important to have a source of space heating which gives immediate response to these changes in either direction by increasing or reducing the amount of heat emitted. There are several ways of achieving this, using a thermostat control on one or more heaters. Air temperatures below which intensively-housed livestock should not be allowed to go are:

| | *deg. F* | | *deg. F* |
|---|---|---|---|
| Adult cattle | 35 | Fatteners | 65 |
| Young calves | 60 | Adult poultry | 40 |
| Farrowing sows | 55 | Broilers 3–7 weeks | 60 |
| Newly-born piglets | 80 | Day-old chicks to 3 weeks | 70 |

These are house temperatures, and in the case of the day-old chicks exclude the brooder area, which should start at 90°F and drop to 70°F by three weeks. For piglets, the temperature is that which should be found in the nest or creep.

**Christopher Dadd,** **formerly the Senior Crop Husbandry Officer in the Eastern Region of the N.A.A.S., takes up a new appointment this month as Technical Director and Secretary of the Royal Agricultural Society of England**

# Books

supplementary reading outlined, every newcomer should possess, and regularly use, McConnell's *Agricultural Notebook* and Fream's *Elements of Agriculture*.

*Farm Crafts Today* fills a gap in our agricultural literature—and fills it uncommonly well. It merits circulation on a wide scale and should certainly be bought by every student whilst on the farm and before proceeding to his technical training.

*I.M.*

**Farm Crafts Today.** PHILIP LYTH. Evans Bros. 15*s*.

The introduction of new machinery, the reorganization and rebuilding of farm buildings, problems associated with the economy of labour, of weed and insect pest control and fertilizer application, these and countless other problems that come to mind have inevitably given rise to the need for greater skill in farm crafts and a much wider knowledge and clearer appreciation of the whole technique of farming itself.

Thus the new entrant to the industry, be he (or she) from town or country, urban or rural bred, needs sound instruction from the start rather than being allowed to pick up what he can, as best he can. The responsibility of training the new entrant is indeed very great, and as Principal of one of our Farm Institutes Philip Lyth has first-hand knowledge of the deficiencies in training experienced in the past.

His new book forms an excellent introduction to farming for these young people; contains much sound common sense and a wealth of easy-to-understand illustrations. Used sensibly with the first-hand instruction of the farmer or farm worker to supplement it, and in conjunction with the necessary discipline of keeping a detailed diary, this book is likely to prove invaluable in the acquisition of sound practice.

Minor comments might be made. It would have been more logical, perhaps, to deal with rotavation at the same time as ploughing or at least to have given cross-references. In dealing with the electric fence, the method of laying out a field and back fence to suit shape, position of water trough, and so on would surely have been very helpful. Irrigation needs mention, as does the control of perennial weeds by chemical means; but these are all relatively small points which can be met in future editions.

There is a useful list of publications for further reading but the value of the book would be greatly increased if an index were included. Moreover, it might be suggested that, in conjunction with this book and the

**Poultry and Eggs in Britain 1961-2.** K. E. HUNT AND K. R. CLARK. University of Oxford. 25*s*.

This volume is the second of the special books of Poultry Statistics published by the University of Oxford Institute for Research in Agricultural Economics, and it is hoped that the series will continue annually. Everyone connected with the production, processing and distribution of eggs and poultry meat will find the data invaluable; likewise the introductory notes to each section. These notes are an innovation. The main sections cover egg suppliers in Britain, prices of eggs, cost factors for eggs, poultry meat suppliers, poultry meat prices, costs and returns of poultry meat, home market for eggs and poultry, and the egg and poultry situation abroad.

Roughly 10 in. × 8 in. to the page, with the printing all on one side of the paper, the book is very easy to consult. The authors are to be congratulated on the careful assembly and fair presentation of so much data from so many sources.

*W.M.A.*

**Manual of Modern Pig Housing.** The Nutrition Information Centre of the Vitamins Group. 21*s*.

Containing forty pages packed with detail, shorn of time-wasting verbiage, and claimed to be a key to profitable farming, this publication by the Pig Section of the Vitamealo Advisory Service is the latest addition to the list of pig housing books and papers.

Sensibly, it does not seek to argue a case for one or other of the myriad types of pig houses available. What it does do is to present the reader with sound ideas based upon a long and careful study of pig housing, feeding and management, incorporating research, experimental work and practical experience of others which has been carefully analysed and weighed.

It is a collection of drawings and photographs supported by text which is a model of clarity and conciseness, and covers all aspects of housing and management. Readers can obtain free copies of a range of pig housing plans from the publishers, and in some cases can also have a priced schedule of the quantities of materials needed to erect the buildings—a valuable help to 'do-it-yourself' enthusiasts.

Though not a text-book, students should find it helpful, particularly in those vital last days before the exam! Landowners, farmers, land agents, and others advising on pig housing, should find this book a useful and cheap way of buying experience.

Copies can be obtained from the publishers at Upper Mall, London, S.W.6.

*C.R.*

**A Glossary for Bird Watchers.** MICHAEL LISTER. Phoenix House. 8*s.* 6*d.*

Undoubtedly a most useful little book to have at one's elbow. Time was when a bird watcher of average intelligence could keep abreast with no more than a knowledge of everyday English. That, plus a smattering of such Greek and Latin prefixes as had stuck through thick and thin since school-days and, if possible, a nodding acquaintance with German was sufficient. But hardly so nowadays—although let it be admitted that your *really* great exponent still makes his meanings crystal clear with little or no resort to coined or alien phrases.

For the rest, we lesser mortals, whether reader or author, must need spread the net more widely to understand or be understood, for bird watching is no longer the compact, companionable and comfortable pursuit it used to be.

Many of us have followed gods other than English Literature and Classics. We may not be able of our own resources to resolve the babel of terms and concepts now let loose upon us by the experts—the meteorologists and radar-scanners, the students of migration and nutrition, the chemists and physiologists, the behaviourists and statisticians that beset the birds today. Here is the justification for this small book.

The range indeed is so wide that, as the author himself is first to admit, a Glossary attempting to cover *everything* would compass its own undoing through sheer unwieldiness. As it is, his selection is admirable; his sources unimpeachable; his own definitions and arrangements sufficient and succinct: a very useful *vade-mecum.*

*E.A.R.E.*

**Timber in Building.** A. L. OSBORNE. Batsford. 35*s.*

Most of us on farms work with timber, whether for minor repairs or for more ambitious schemes. In the course of the years we pick up some adventitious and largely empirical knowledge of the nature of the stuff we are using. Because of this there are large gaps in our knowledge which prevent us from exploiting the materials or our skills to the full.

We make do with tongued-and-grooved matching when possibly we would have been better served with a sheet of chipboard or blockboard. We fight shy of using plywood externally, believing that the sheet will come apart. We have not heard of W.B.P. grade plywood.

This means that we seldom get the best out of our materials, and the jobs we do probably cost more than they need and do not perform their function as well as they might.

While not written primarily for the farmer, Mr. Osborne's book will do much to fill these gaps. It contains easily understood descriptions of timber, not only in its natural form but also as plywood, chipboard, etc. It deals at some length with the structural use of timber, also with flooring and cladding, and ends with a chapter on timber protection and finishes.

While the author would not pretend to provide ready-made answers to many of the problems facing the farmer who uses a saw and hammer, he does give a wealth of sound background information so that the best possible use can be made of the different materials available for the various circumstances that may arise.

Nor does the book make difficult or heavy reading. It is written in a pleasant, easy style and is admirably illustrated with line drawings and photographs.

*M.F.T.*

**The State of Food and Agriculture, 1962.** The Food and Agriculture Organization, Rome. H. M. Stationery Office. 10*s.*

Once again the annual FAO report presents its admirable summary of the world's agricultural situation. Full of interesting information, the following facts may be commented upon.

First of all, production: there has been no increase during the year. The index figure (base 1952-57) has dropped from 106 to 105 for the world, and the world population has risen by 1·8 per cent, so that *per capita*

production has fallen. The moral is, then, that there is still an unsatisfied demand for food.

In spite of this, there remains the problem of surplus stocks in some countries; but wheat stocks were reduced by 15 per cent, mainly due to sales by the U.S.A. to mainland China.

The comment on farm prices and income is interesting: in most cases there was little change in farm price relationships, but of the twelve countries which have a continuous series of data (Britain is not one of them), in only two did the ratio of the amounts they paid and received move in the farmers' favour. In spite of this, retail prices of food have continued to rise sharply.

The cost of living and the cost of food indexes between 1953 and 1961 show that, in countries where the general cost of living index has risen quickly, the retail price of food has risen even more so. In countries where the general price level has been more stable, the two indexes have moved closer together. This emphasizes the importance of good supplies of food as an anti-inflationary force in developing countries. But it is really self-evident: a man does not buy a bicycle and a sewing-machine until he and his family are fed.

*G.O.*

**The Profitable Use of Farm Chemicals.** SYLVIA LAVERTON. Oxford University Press. 10*s.* 6*d.*

As a thoroughly practical guide to the use of farm chemicals in Britain, what could be better than this small book? The author is to be congratulated on her deft handling of a complex subject. Fortunately for her, the book is 'B.C.' ('Before Carson'), so that it is not bedevilled by the 'Silent Spring' controversy, but nevertheless it does discuss many of the points emphasized with so much force by Dr. Carson.

In passing, we note a new word usage forming: 'farm chemicals' is taken to mean only pesticides and weed-killers, and now excludes the fertilizers and disinfectants the phrase once included.

A foreword by Sir William Slater sets the stage for the author's discussion of the profits to be made by controlling pests. Sir William points out that, whilst the cost of using a chemical can be ascertained comparatively easily (not so easily as it might be thought, be it noted), the amount of damage saved by its use is a more difficult matter to determine.

The author then plunges into this complex field, and simplifies the whole matter by using an individualist approach. This, naturally, is what is wanted in a farmer's guide. The book shows very clearly where, how and what the farmer can gain by using the various pesticides now available. Mrs. Laverton presents very clearly a great deal of data; for example—her chapter on costs and profit of weed-killers is a masterpiece of concise reasoning. But this treatment does exclude the consideration of overall and long-term effects.

However, there is a chapter on the alternatives to chemical control which points out the many difficulties in that field, and underlines the immediate appeal of farm chemicals.

The book is well presented, with good photographs and charming line drawings by Clare Allen. It is a useful tool for the modern farmer; the scientist would probably like to see a better documentation of the many facts quoted.

*G.O.*

**A Bibliography of Farm Buildings Research 1958-1961. Part I: Buildings for Pigs: 1st Supplement.** Agricultural Research Council. 4*s.*

There are nearly as many different ways of keeping pigs as there are pigs—and a great variety of housing systems to match! A search for a standard pig house has been going on for years and is likely to continue, if only because the pig is such an adaptable animal, able to make up for deficiencies in management and housing.

But the days of 'hit and miss' must be drawing to a close. Sheer economic necessity must compel pig keepers to secure optimum conditions for pigs, to say nothing of improved strains.

Perhaps the pig's adaptability has been a cause of confusion, and that's why we have no standard piggery. Or it could be plain ignorance of what the pig really needs. However, we should very soon see the blueprint of a piggery which will be economic in construction and in use. To help us we have this admirable bibliography, the first supplement now in issue. The original contained 123 abstracts of work from 1945–1958—13 years. This supplement contains 284 and covers only 3½ years, to the end of 1961. Such is the volume of research into pig problems and housing throughout the world.

No longer can we justify pig housing based solely on practical experience and bright ideas. The bibliography already contains the outlines of sufficient work to enable building designers to provide what the pig really needs. They will be much nearer to the goal of a standard pig house if they also keep in mind what the pig man needs, and the owner's interest in economic building. The next step will then be to wean pig keepers from the many types with many names!

This supplement is absolutely essential to those who design pig buildings; without it they will be working blindfold.

*C R.*

**Pictorial Poultry Keeping (Second edition).** D. DE SAULLES. C. Arthur Pearson. 18*s*.

Educational books of any type on agricultural subjects are all too few; surprisingly so, considering the great growth of the movement toward enlightenment in the past few years. Day-release classes of further education centres, the broadening of the agricultural apprenticeship scheme and the extension of agricultural instruction in schools, have reinforced the work of the older-established Young Farmers' Clubs, farm institutes, the Y.M.C.A. training scheme, etc.

One of the few publishing houses which has catered for this demand over many years is C. Arthur Pearson, Ltd., and its latest addition to a long list of livestock-keeping and horticultural instructional works is the extensively revised and modernized second edition of *Pictorial Poultry Keeping*. For beginner or student in poultry production, and for library shelves in all agricultural teaching centres, this is likely to be most useful.

It is, as the name indicates, a profusely illustrated work, some 475 plates appearing on more than 200 pages, with explanatory text. What is particularly striking is the excellence of the pictures, their clarity and the thoroughness with which the contents go into every important aspect of modern poultry keeping for profit.

The aim is obviously to present an introduction to the subject. The book therefore deals impartially with such controversial matters as intensive *versus* semi-intensive egg production and pure or cross-bred layers compared with hybrids. It contents itself with presenting in all cases the principal facts, both for and against.

*J.H.*

**Cooper's Crossing.** A. G. STREET. Robert Hale. 15*s*.

Not for five years has A. G. Street published a novel, although we have had his controversial and penetrating newspaper comments to beguile us every week. Many millions of words must he have written over the years, without losing that fruitful itch to record the agricultural scene, and to pass judgment according to his own wise and forthright way of thinking.

Now comes Mr. Street's thirtieth book, *Cooper's Crossing*, the saga of a farming family in Western Canada and England from 1880 to 1960; the long journey of the Georges who tilled the soil, raised families, fought in two Great Wars, and experienced all the heavens and hells of farming as they pitted their wits and brawn against the troubles that beset farmers everywhere.

The first Cooper starts it all at Cooper's Crossing in Southern Alberta, where he halts his wagon and decides that here is the spot to build his homestead and plough the virgin soil. He does it all successfully and pioneers a prosperous town. And an intriguing and revealing story it makes.

Here was a land boasting millions of acres of virgin prairie bursting with the accumulated fertility of centuries in its top soil; all ready for the plough, first with horse and then with tractor. But ploughed for the moment and not for the future—the classic mistake of many lands and many ages. In other words, exploitation.

There follows nature's revenge: the drought of the late twenties; the hot winds and the blowing soil. And as the earth crumbles, so do the fortunes of the pioneers. Which evokes this piece of wisdom: 'Land's like a woman. You gotta love it and coax it, 'sted o' tormenting it with machines, if you reckon to get anything worth while out of it.'

And from the havoc another young George is impelled to go off to university, to study soil science and find where the others went wrong. So to the search for drought-resistant grasses and clovers; such cultivation devices as strip farming—fallow and crop.

But again another war and another George goes to England, finally to recognize that farming is more kindly where rain can be depended upon. Once again the wagon pulls up, but in another land.

*Cooper's Crossing* moves quietly over the years with an earthy lustre. It is not the sort of book you cannot put down; but the ultimate harvest is rewarding.

*A.R.*

**Barn Hay Drying at Auchincruive.** (RESEARCH BULLETIN No. 30.) West of Scotland Agricultural College. 2s.

Barn drying of hay is a subject in which interest is steadily growing. The reduction of costs, by using efficient field and drying methods and better management techniques, coupled with excellent results from feeding the barn-dried hay to stock, make it an economic proposition on many farms, particularly in the wetter areas.

This Research Bulletin, which describes three years' work with a home-built batch drier at Auchincruive, is therefore most welcome. It is divided into two main sections, Management and Costs, and Nutritional Aspects, is very well produced and contains some excellent photographs.

It is noteworthy that second-hand poles and timber were used in the construction of the Auchincruive drier, a point well worth investigation by intending constructors.

The factual account of the construction of the drier and the methods used, from cutting the grass to loading bales into the drying bays, is most readable. Beside the bare facts and figures there is a lot of useful guidance on aspects such as when to cut, when and how to bale and how to operate a drier. It is clearly written by practical people.

Costs of barn drying were not excessive and the authors express complete confidence in this system of haymaking. The improvement in quality, they say, far outweighs the slightly increased overall cost compared with other methods.

Although the Bulletin describes batch drying, most readers will know that there are other methods of making barn hay. For instance, storage drying is very attractive from the point of view of saving labour.

The section on nutritional aspects is brief, about half being taken up by the results of digestibility trials.

There are useful observations resulting from feeding barn-dried hay on a commercial basis to beef and dairy cattle, but it is a pity that facilities did not permit strictly comparative experiments.

Copies of the Bulletin are available from the College at Oswald Hall, Auchincruive, by Ayr. *M.V.J.*

ACKNOWLEDGMENT OF PHOTOGRAPHS

We gratefully acknowledge permission to use the following photographs:

pp. 6, 8 and 9. Professor W. Ellison; p. 12. *Farmer and Stockbreeder*; pp. 14 and 33. *Farmers' Weekly*; p. 16. H. J. Hine; pp. 18 and 19. Practical Power Farming; pp. 25, 26 and 27. P. Clarke; p. 44. Boots Pure Drug Co. Ltd.; p. 45. The Sport and General Press Agency Ltd.

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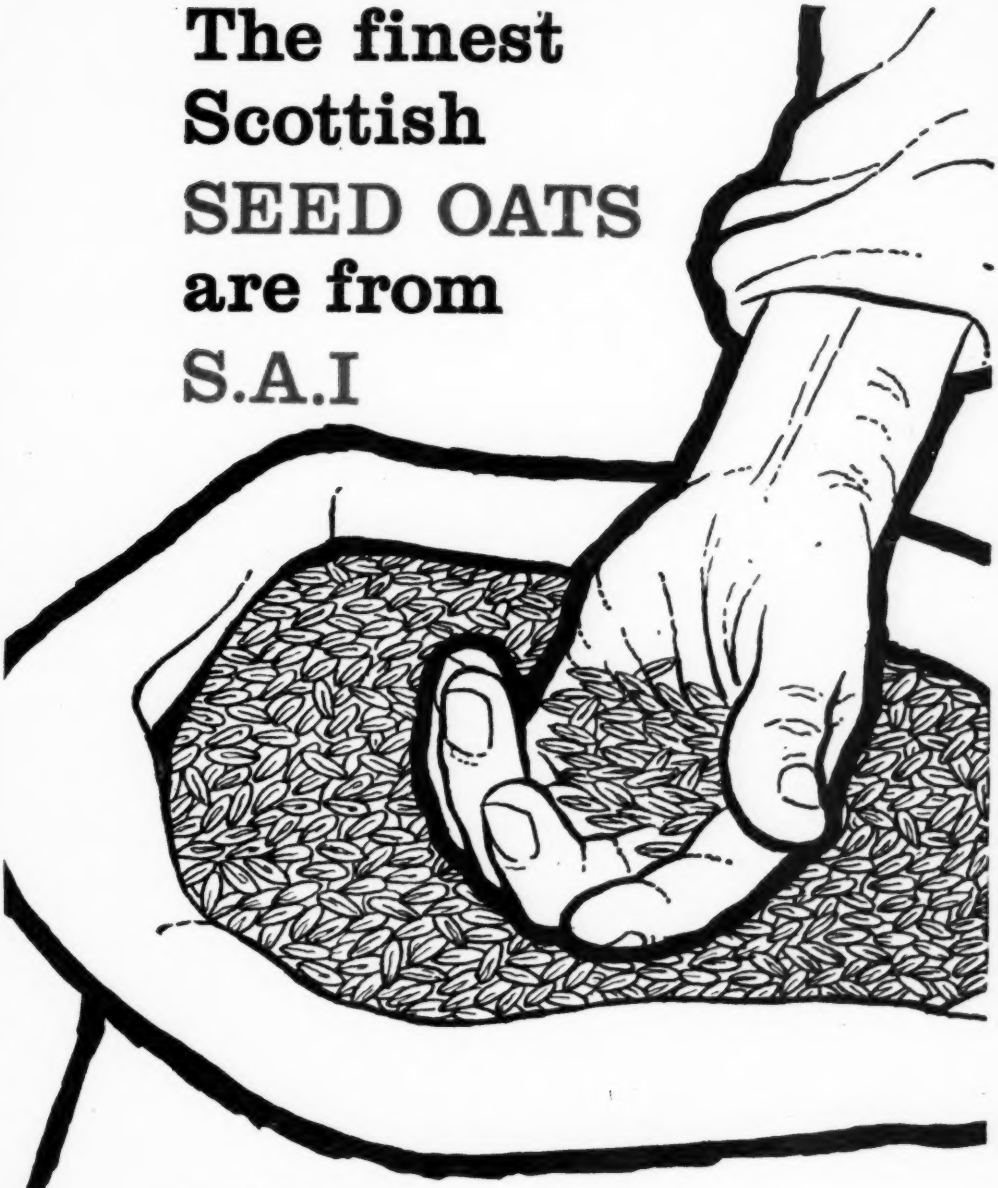

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